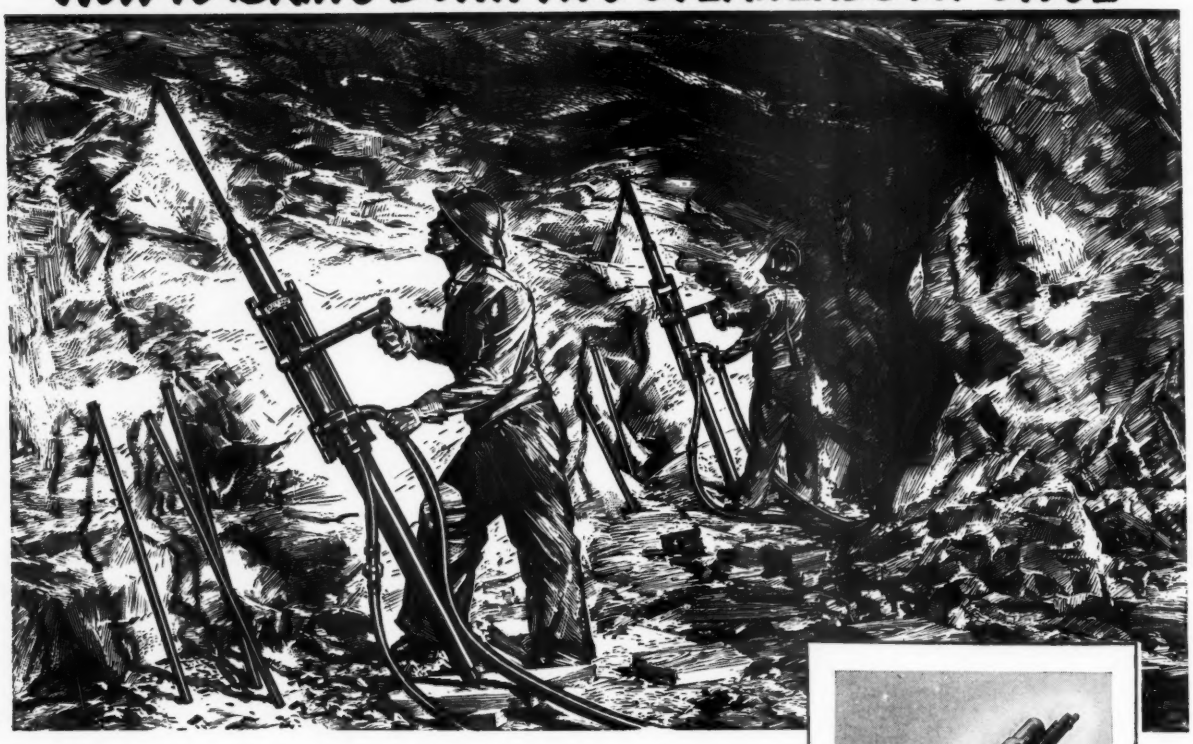
Mining CONGRESS JOURNAL

HOW TO BRING DOWN TWO "OVERHEADS" AT ONCE



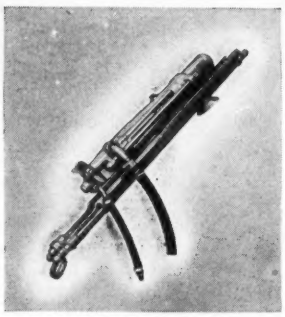
Drilling smoothly and easily into the hardest rock, this Blue Brute Stoper is cutting down maintenance costs at the same time. It's the new, self-rotating WR-31 — a fast, tireless performer that will do a lot of heavy drilling for you on very little air.

From end to end the WR-31 is crammed with new design improvements. For instance, the ratcheted rifle bar engages four air-operated pawls on the piston's backstroke. There's positive action here, with extra solid, longer lasting construction — and it's exclusively Worthington!

That proper position of the holding handle — *above* the centre of gravity for better balance — will make a big hit with your runners. They'll like the shielded, down-directed exhaust and the air and water tube construction which insures a constant air stream that keeps sludge and water out of the shielded type chuck.

Men who use stopers *know* stopers— and you'll save money by giving them equipment that combines easy handling with tops in efficiency. How about letting them get the "feel" of the new WR-31 in an easily arranged demonstration? Watching this speedy, economical Blue Brute in action will prove to you, that *there's more worth in a Blue Brute.*

Write for literature describing the complete line of BLUE BRUTE Mining Equipment, including Drifters, Stopers and Hand Drills.



BLUE BRUTE DRIFTERS

Types WPM (Pneu-Motor Incorporated in Drifter), WPMS (Pneu-Motor on Shell), and WHC (Hand Crank). Featuring the new, *balanced* design for faster drilling cycles and all-around operating economy.

BUY BLUE BRUTES

H7-11

Semi-Portable Compressors. Drifters with Feed Motor Incorporated. Drifters with Feed Motor on Shell. Hand-Crank Drifters. Stopers. Hand-Held Rock Drills.

WORTHINGTON

Worthington Pump and Machinery Corporation. Worthington-Ransome Construction Equipment Division Holyoke, Mass.

Mining CONGRESS JOURNAL

Contents

VOLUME 33, NUMBER 5 FOR MAY, 1947

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FRONT COVER: **Mining gold and silver 10,000 feet above sea level near Idaho Springs, Colorado.** *Photo courtesy Caterpillar Tractor Co.*

Page

EDITORIALS 20

UNDERGROUND MECHANIZATION AT NEW IDRIA..... 21
By C. HYDE LEWIS

HIGH PRODUCTION FROM TRACK LOADERS AND LARGE CARS..... 25
By HARRY HINES

THE SAGA OF RED MOUNTAIN IRON..... 28
By A. A. NILSEN and ROY YINGLING.

THE HEAT PUMP FOR COMFORT HEATING AND COOLING..... 37
By E. R. AMBROSE

FULL-SEAM MINING WITH MECHANICAL LOADING..... 41
(A Coal Division Report)

WHEELS OF GOVERNMENT..... 45

PERSONALS 47

NEWS AND VIEWS..... 49

MANUFACTURERS FORUM 62

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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309 MUNSEY BLDG., WASHINGTON 4, D. C.

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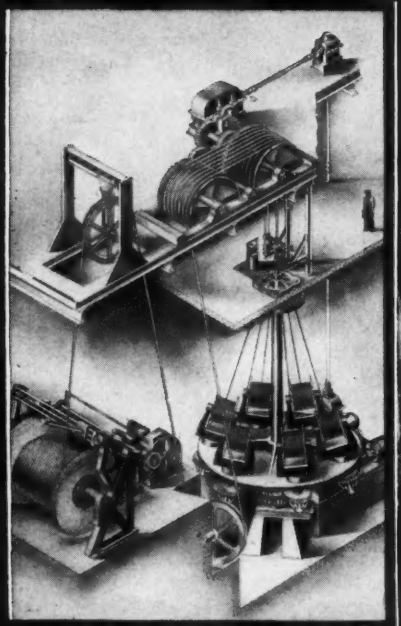
Published Monthly. Yearly subscriptions, United States, Canada, Central and South America, $3.00. Foreign, $5.00. Single copies, $0.30. February Annual Review Issue, $1.00. Entered as Second-class Matter, January 30, 1915, at the Post Office at Washington, D. C.

Member, Audit Bureau of Circulations

Here's union's *Wire Rope* Formula

MM+OE+

MODERN MACHINERY PLUS OPERATING EXPERIENCE



M. B. HANSELL, SR.
SUPERINTENDENT OF MAINTENANCE

For 41 years a master of machinery. For 20 years in charge of installation and maintenance of all Union Wire Rope machinery; including the giant 4 story closing machine at the left. It is capable of producing 27 tons of wire rope in one continuous length or up to 4" diameter.

A. D. GALLOWAY
SUPERINTENDENT ROPE MILL

For 28 years a specialist in the stranding of wires of the right size and correct steel and closing of the right strands into hundreds of different wire rope constructions. A "know how" specialist who has trained hundreds of craftsmen.

CURTIS VOIGTLANDER
SUPERINTENDENT WIRE MILL

For 43 years actively engaged in the drawing of high carbon wire and the training of craftsmen in all the intricate processes. Under his supervision many new and advanced wire making machines have been built, many others improved.

union-formed is *Preformed*

UNION-FORMED SPOOLS BETTER

. . . even with a light load it winds evenly and tightly.

UNION-FORMED RESISTS KINKING

. . . because wires and strands are free of internal stress, they do not fight to get out of their preformed positions.

UNION-FORMED RESISTS BENDING FATIGUE

. . . withstands more bends, even reverse bends, because it is more stress-free internally.

UNION-FORMED RIDES BETTER ON GROOVES

. . . does not spin and grind through blocks or over sheaves.

UNION-FORMED IS SAFER TO HANDLE

. . . worn, broken wires do not spring out and porcupine but continue to lie close to the rope.

UNION-FORMED IS FLEXIBLE AND RELAXED

. . . bends in any direction, yet has "toughness" to withstand jerking and other punishing strain.

TKH=CQ

PLUS TECHNICAL KNOW HOW EQUALS CONSISTENT QUALITY

C. M. ZERR
CHIEF ENGINEER

Since graduating at Stevens Institute of Technology, he has specialized in all technical and research phases of wire rope making as assistant to Walter Voigtlander. Their technical department is the training ground for operation men, salesmen and technicians.

WALTER VOIGTLANDER
TECHNICAL DIRECTOR

For 43 years engaged in wire rope technology and research. Under his direction for 20 years, the Union Wire Rope laboratory and technical staff has become widely recognized as the foremost in the industry. From this continuous research comes new rope constructions, new rope making equipment and consistent quality.

Wire rope in itself is a machine. It functions as the steel tendons of many types of machines and to be good it must be made on the most modern of machines. Many of the machines in the Union Wire Rope plant have been either wholly designed or improved by our own mechanical engineers.

These precision machines must be minutely adjusted and maintained in perfect condition to produce uniformly high quality in all of the hundreds of different wire rope constructions. Many years of operating experience is contained in the Union wire rope making formula.

The most vital ingredient is Technical Know How. It is obtainable only from long years of training, experience and continuous research. Ours is an organization of specialists who devote their whole time to wire rope making. It is headed by top flight engineers and technicians who through research are constantly acquiring more know how for use in specifying the finest wire rope making steel; in making every wire rope drawing process improve each heat of steel still further; in constructing wires of the finest steel into stronger, tougher wire ropes, both ordinary and Union-formed (*pre-formed*); in the development of new wire rope constructions to whip jobs noted as rope killers.

NEAR YOU THERE IS A UNION WIRE ROPE DISTRIBUTOR AND REPRESENTATIVE CAPABLE OF APPLYING UNION "KNOW HOW" IN THE FIELD

Large and regular doses of "know how" are given Union Wire Rope's field specialists and distributing organizations. They know that Union Wire Rope must do a consistently better job on the job for which it is constructed. Each field specialist, each distributor is fully equipped with a thorough working knowledge of wire rope applications and is capable of making sound recommendations. Each is a substantial citizen contributing to the economic and social welfare of his community and is an important factor in maintaining the American way of opportunity and freedom unequalled anywhere in the world.

Backed by "know how" specialists, each Union Wire Rope distributor is out to earn and hold your good will.

union Wire Rope **Corporation**

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Send "Steel Tendons," the book that gives a pictorial trip through your modern plant.

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MINES *Safety Circuit Center* POWER DISTRIBUTION SYSTEMS

Designed to deliver *maximum* available power through *minimum* lengths of sectionalized cable – thereby making it possible to deliver, in an approved manner, the rated capacity of work from all mining machinery. This results in safety to personnel and equipment. It also reduces costs and improves production. Among many other exclusive MINES features are—

- Connectors drop load in process of opening – *eliminating* power arcs.
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- Power is fully restored *without* opening breaker compartment. Stay permissible in operation. No tools or parts required to restore power.
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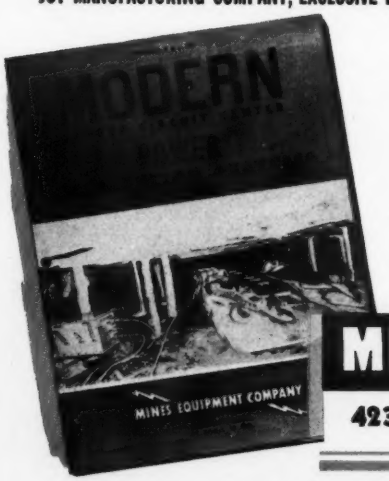
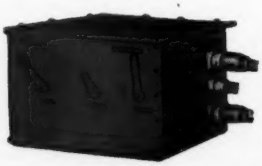
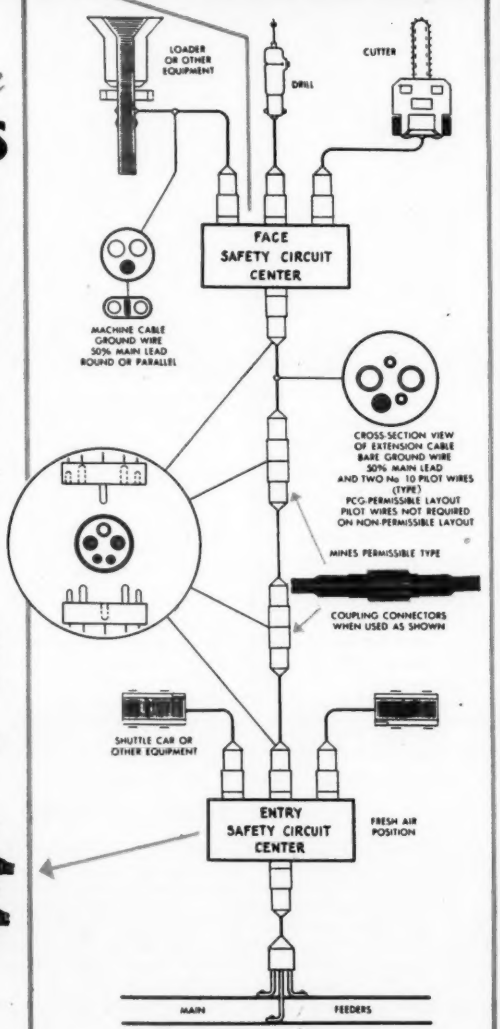
For *maximum* protection to personnel and equipment you won't go wrong when you adopt the MINES POWER DISTRIBUTION SYSTEM. *Get all the facts*—send for your copy of our bulletin today.

JOY MANUFACTURING COMPANY, EXCLUSIVE DISTRIBUTORS TO MINING INDUSTRY






LOADER OR OTHER EQUIPMENT
DRILL
CUTTER
FACE SAFETY CIRCUIT CENTER
MACHINE CABLE GROUND WIRE 50% MAIN LEAD BOUND OR PARALLEL
CROSS-SECTION VIEW OF EXTENSION CABLE BARE GROUND WIRE 50% MAIN LEAD AND TWO No. 10 PILOT WIRES (TYPE)
PCG-PERMISSIBLE LAYOUT PILOT WIRES NOT REQUIRED ON NON-PERMISSIBLE LAYOUT
MINES PERMISSIBLE TYPE
COUPLING CONNECTORS WHEN USED AS SHOWN
SHUTTLE CAR OR OTHER EQUIPMENT
ENTRY SAFETY CIRCUIT CENTER
FRESH AIR POSITION
MAIN
FEEDERS

MINES EQUIPMENT COMPANY

4233 CLAYTON AVE. MINES **ST. LOUIS 10, MO.**

This is a box-girder cross-member.

It is a Mack box-girder. Mack engineers designed it; you find it only on Mack trucks. It has proved the best all-around cross-member ever designed.

It has tremendous beam strength in both vertical and horizontal planes. It possesses extremely high torsional rigidity. Its specially designed jaw ends assure greatest possible stiffness at every junction.

Consequently, it ties side-members together positively; always keeps them uniformly spaced. It imparts exceptional torsional stiffness to a frame. It won't spraddle. It produces a frame that won't weave, a frame that stays true, a Mack frame!

This cross-member is an example of what we mean when we say a Mack is a precision-built truck and not a mass-production truck. Every part of a Mack is specifically designed and engineered to do its job.

We put this extra work into Macks—so you can get extra work out of them.

Mack

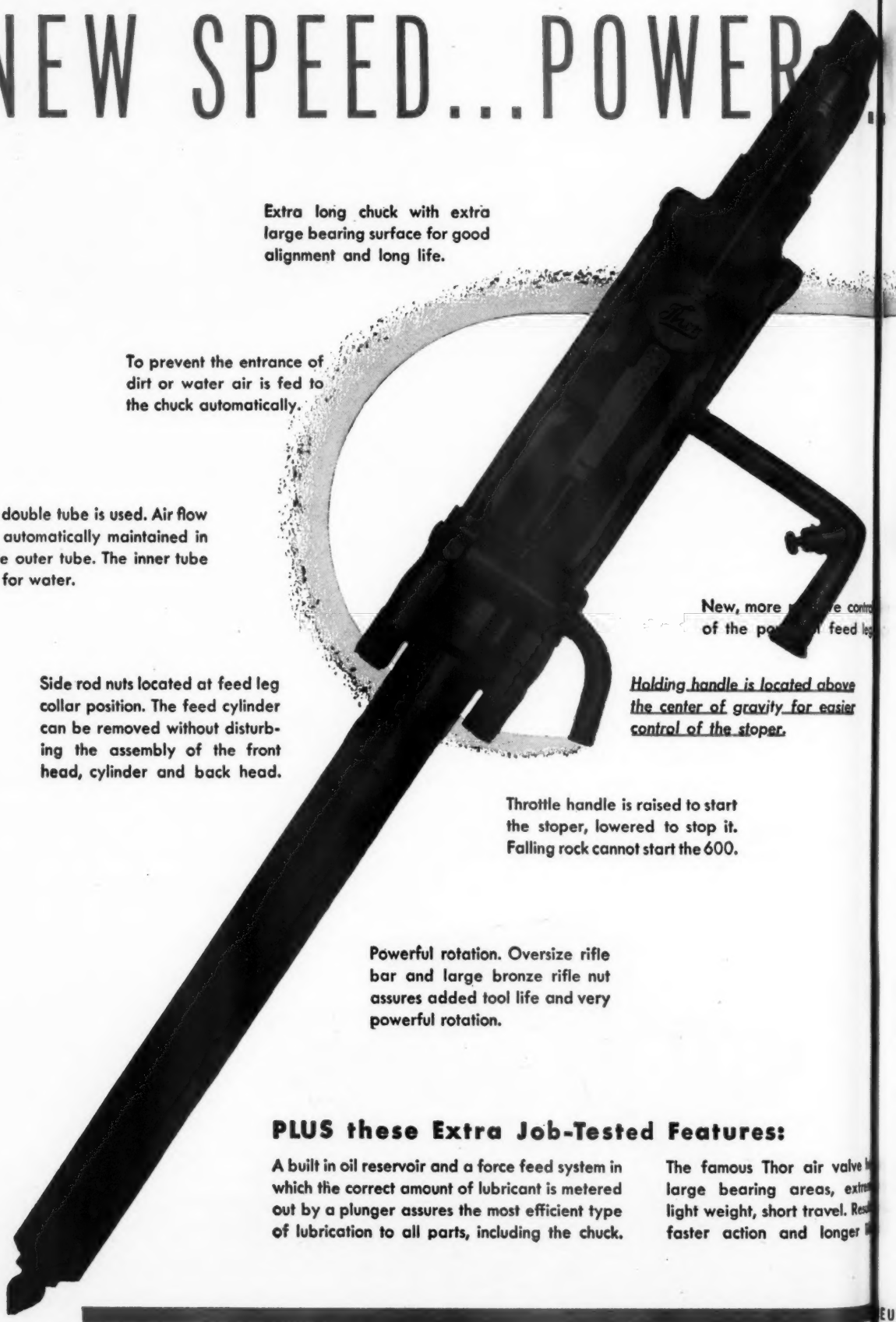
since 1900, America's hardest-working truck

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada Ltd.

Trucks for every purpose

WORKING IN MIRE like this calls for all the stamina and driving power you can get in a truck. This mighty Mack LR Model is equipped with the exclusive Mack axle-type Power Divider which preserves traction where the going is slippery. It is in the service of **Signal Mountain Portland Cement Company.**

NEW SPEED...POWER



Extra long chuck with extra large bearing surface for good alignment and long life.

To prevent the entrance of dirt or water air is fed to the chuck automatically.

A double tube is used. Air flow is automatically maintained in the outer tube. The inner tube is for water.

New, more [illegible]e contro[illegible] of the po[illegible] feed leg

Side rod nuts located at feed leg collar position. The feed cylinder can be removed without disturbing the assembly of the front head, cylinder and back head.

Holding handle is located above the center of gravity for easier control of the stoper.

Throttle handle is raised to start the stoper, lowered to stop it. Falling rock cannot start the 600.

Powerful rotation. Oversize rifle bar and large bronze rifle nut assures added tool life and very powerful rotation.

PLUS these Extra Job-Tested Features:

A built in oil reservoir and a force feed system in which the correct amount of lubricant is metered out by a plunger assures the most efficient type of lubrication to all parts, including the chuck.

The famous Thor air valve [illegible] large bearing areas, extre[illegible] light weight, short travel. Resu[illegible] faster action and longer [illegible]

...HANDLING EASE

THE NEW

Thor

STOPER ROCK DRILL MODEL 600

Coming . . . More New Models . . . New Sizes

The model 600 is the fastest, hardest hitting, smoothest handling heavy duty stoper ever built by Thor.

Every feature has been designed to perform to drill runners' specifications . . . thoroughly proved underground and universally approved by the men who have seen the 600 in action.

A trial run will convince you. See your nearest Thor representative for a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY

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Thor PORTABLE POWER TOOLS

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TRU-LAY *Preformed*

for UNDERCUTTING MACHINE PULL ROPE

Mine operators everywhere are more completely mechanizing mining methods to reduce the cost of production. More and more operators are standardizing on TRU-LAY Preformed Wire Rope because the preforming process "mechanizes" the rope. Your men handle more tonnage with TRU-LAY mining ropes. TRU-LAY Preformed helps mechanical methods *still further* reduce the cost of production. On undercutting machines, for instance, where sheaves and drums are small and the work is gruelling, TRU-LAY invariably outlasts any non-preformed wire rope. Also, it is easier and safer for the men to handle. For wire rope, on *any* mining operation, specify American Cable's TRU-LAY Preformed.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

No Boasting . . .just tonnage Boosting!

Power and speed—for loading your large mine cars, two to three tons per minute! One powerful 5-cylinder radial air motor crowds the dipper into the muck pile for a bigger bite. Another lifts the dipper for complete mass discharge into the mine car.

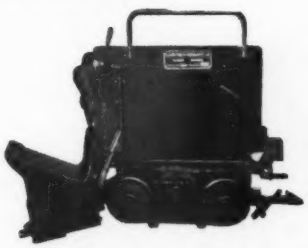
Wide clean-up range—and the muck goes into the mine cars—not beside them—thanks to the automatic centering device which locks the body of the loader on center so that dipper discharges directly into the car.

Simple design saves power—shaft drive to bevel gears on all four wheels—plus fewer gears—gives you every ounce of available power from the air motor.

Protection from discharge shock—the power of the dipper is automatically cut off just as the dipper reaches its upper and lower limit of travel. Thus machine is protected from discharge shock.

Greater safety for operator—a low center of gravity—with the main weight of the loader concentrated near the wheels—means maximum stability on the track. Minimum of outside piping also is an important Gardner-Denver safety factor.

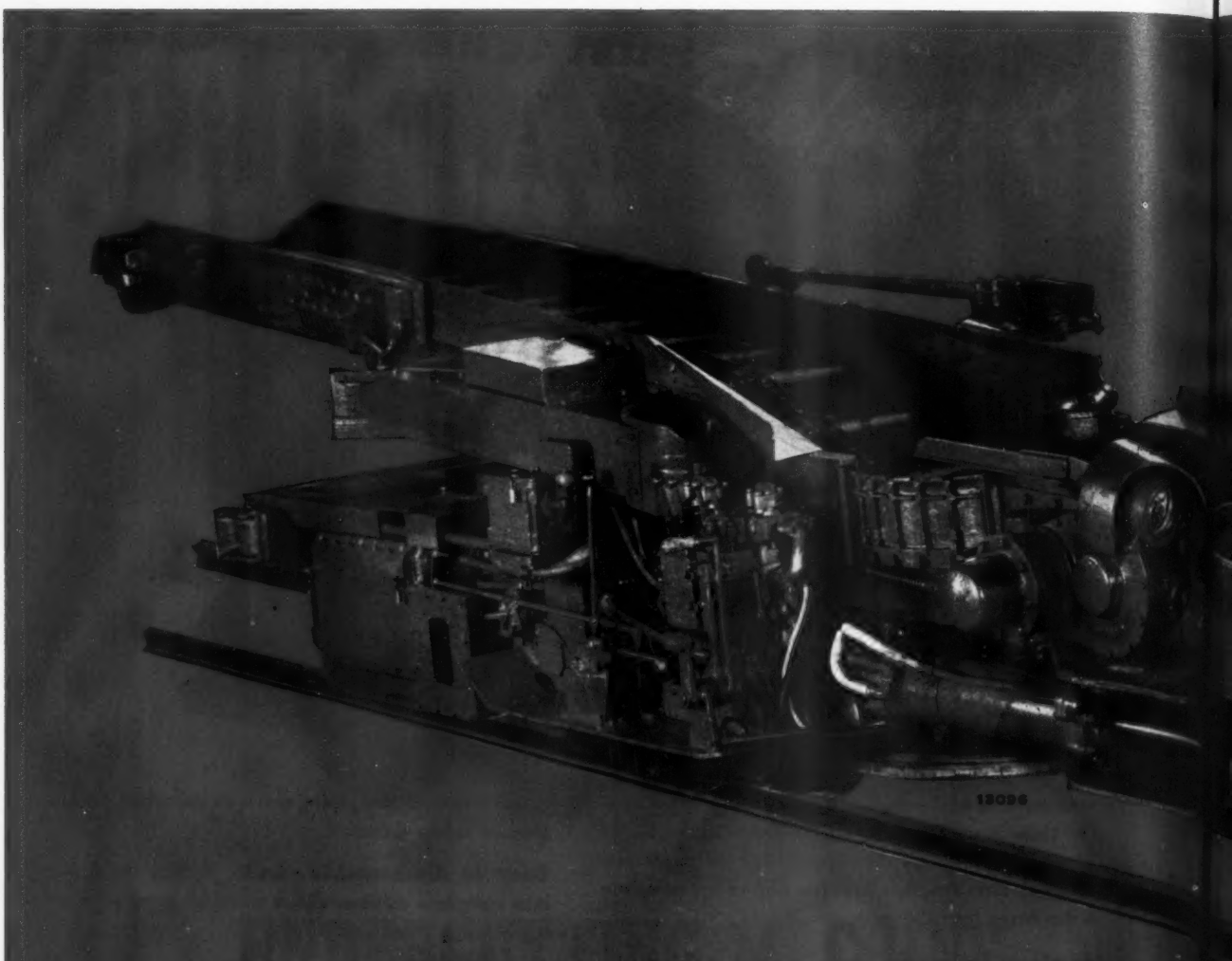
Easy to disassemble—loader knocks down easily into complete sub-assemblies when necessary for moving through small shafts.



Gardner-Denver GD9 Loader—A companion loader to the GD14, the GD9 fills the need where a smaller loader is required. Like the GD14, the GD9 embodies the results of Gardner-Denver's research—meets recognized Gardner-Denver standards of sturdy construction, reliability and fast operation.

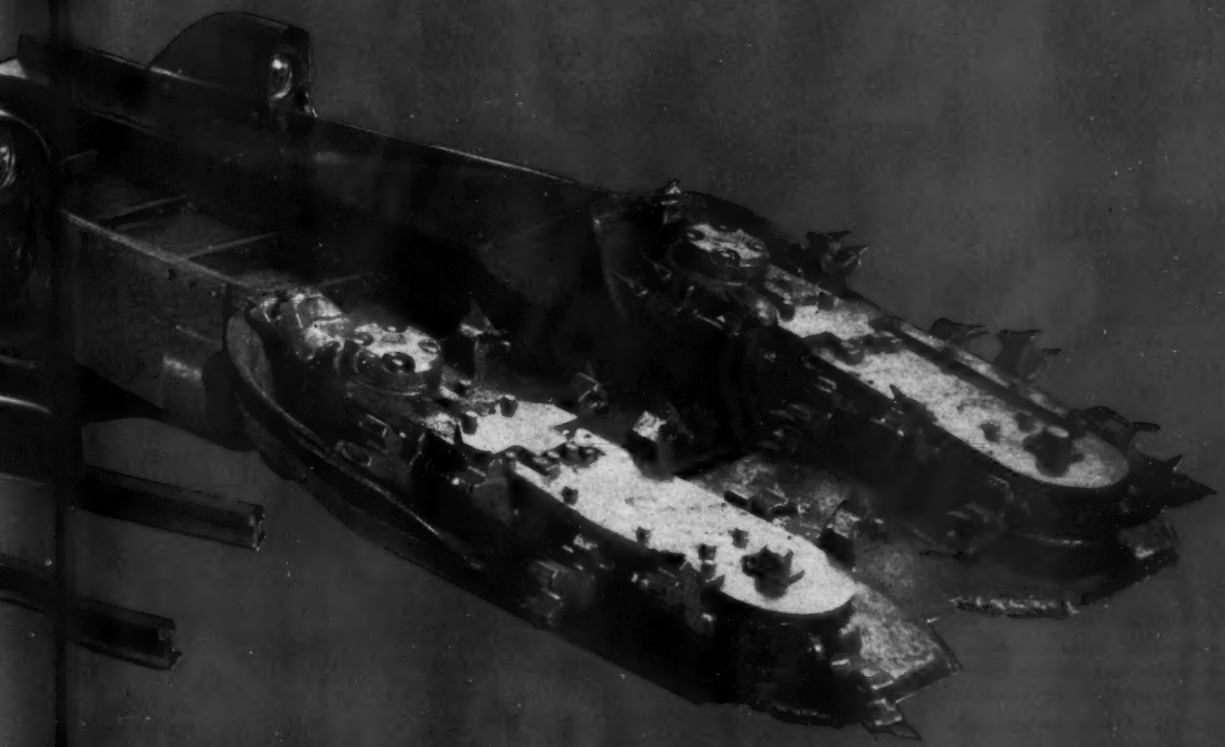
GARDNER-DENVER SINCE 1859

For complete information, write
Gardner-Denver Company, Quincy, Illinois



CAPACITY • SPEED • POWER

GOODMAN
LOADERS



MAXIMUM CLEAN-UP • EASE OF CONTROL • LOW MAINTENANCE

GOODMAN MANUFACTURING COMPANY
CHICAGO 9, ILLINOIS

dependable, SAFE haulage power

Ask a user of EDISON Nickel-Iron-Alkaline Batteries what he thinks of them as power units for locomotives and shuttle cars. The chances are he'll say they provide the closest approach to failure-free uninterrupted haulage power he knows of—and are economical, too.

He may at some time have had a wreck—such as a locomotive falling into a shaft or rolling down the side of a waste dump—and found that the battery not only survived with little or no damage but later went on and delivered full service life.

EVEN "WORN-OUT" BATTERIES ARE USEFUL

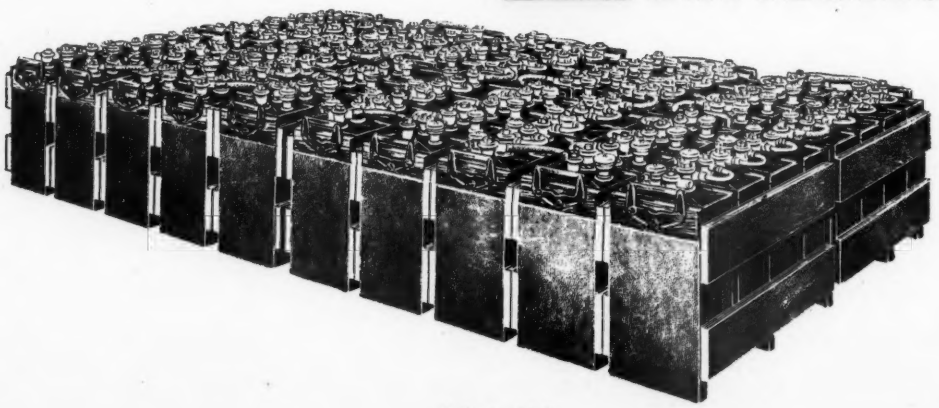
Or, he may have discovered that he can use "worn-out" motive power batteries for various kinds of lighter-duty standby work for which their capacity is still ample, and thus can get more years of dependable service from them.

As a matter of fact, it is only by actually using EDISON Nickel-Iron-Alkaline Batteries that a person finds out how dependable and economical they really are. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Company, Limited, Montreal and Toronto.*

In Mine Locomotives and Shuttle Cars EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages

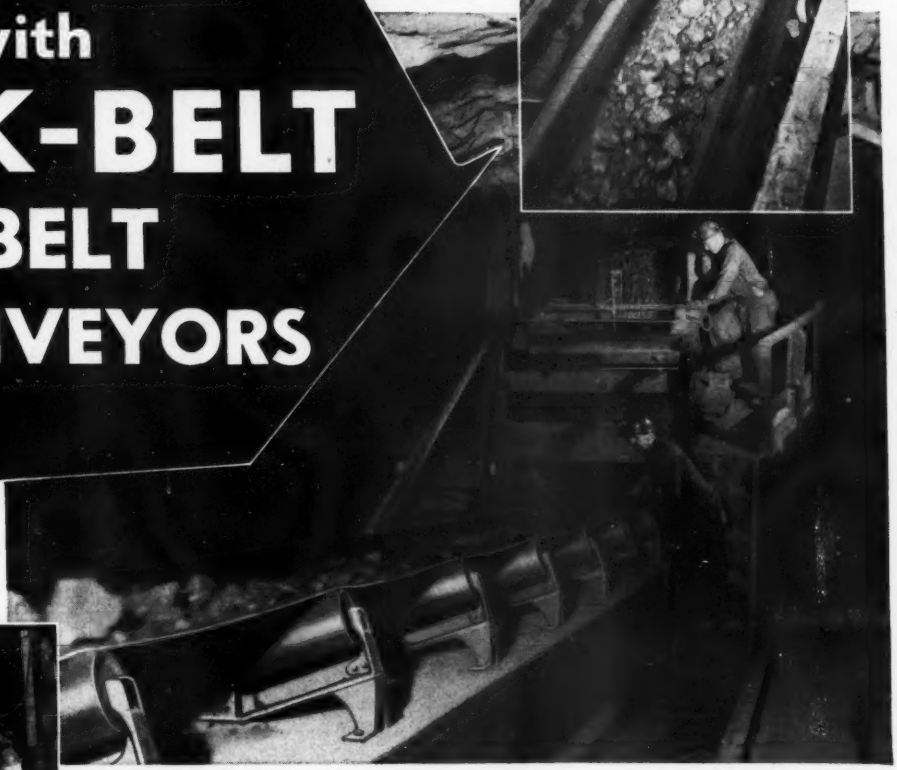
- ★ They are **durable mechanically**; grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- ★ They are **foolproof electrically**; are not injured by short-circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- ★ They can be **charged rapidly**; do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- ★ They **withstand temperature extremes**; are free from freezing hazard; are easily ventilated for rapid cooling.
- ★ They can **stand idle indefinitely** without injury, without attention, and without expense.
- ★ They are **simple and easy to maintain.**

EDISON
NICKEL • IRON • ALKALINE
BATTERIES



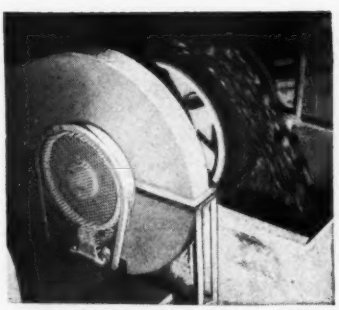
Underground Ore Mining Problem Solved with LINK-BELT BELT CONVEYORS

A section of 400 tons per hour, 36" wide, roller-bearing belt conveyor system handling ore on its 2500 ft. journey.



Ore being transferred from one 450-ft. belt conveyor to the next.

Belt conveyor receiving crushed ore for transport to a higher level.



Each belt conveyor section is driven from a 100 h.p. motor through Link-Belt chain drives. A Link-Belt differential band brake serves to prevent any run-back of loaded belt when stopped.

● All things considered, the engineers at this large Western Canadian ore mining operation, decided that belt conveyors would be the best medium for bringing the ore out of the mine.

A 2538-ft. long belt conveyor system was installed to raise ore through a vertical distance of 680 ft. from the mine's 3350-ft. level to a point above the 3900-ft. or main haulage level. The cost of the belt conveyor was estimated to be about one-half the cost of sinking and equipping a shaft of equivalent capacity. Its operating cost is considerably less. For the proposed shaft, 1800 h.p. would have been required to meet peak starting loads. The belt conveyor system requires only 480 h.p.

Additional depth may be reached by extending the belt conveyor system, whereas with a shaft, the initial installation would have to be made large enough to meet future demands. It has the added advantage of tying in with present transportation. Conveyor system is made in six sections, one delivering to another, and all interlocked electrically. The longest section measures 466-ft.

This is another installation that is proving the high efficiency and low-cost operation of Link-Belt belt conveyor equipment. Link-Belt designs and manufactures complete belt conveyor systems, providing not only the carrying and return idlers, but also terminal driving machinery, discharge chutes, welded steel pulleys, trippers and other mechanical units. Let a Link-Belt engineer show you how you can cut your handling costs.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities. 10,548-B

STANDARD ENGINEERS NOTEBOOK

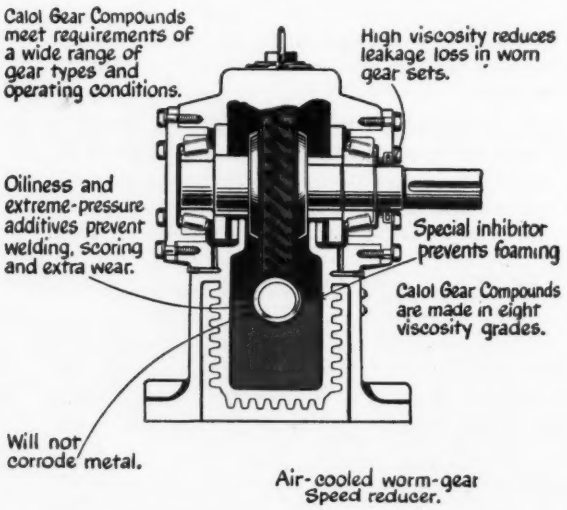
Compounded gear lube prevents excessive wear

Where a relatively heavy lubricant is required in industrial enclosed gears, a Calol Gear Compound is recommended. There are several viscosity grades to meet all conditions—Numbers 60, 100, 120, 135, 150, 190, 225 and 410.

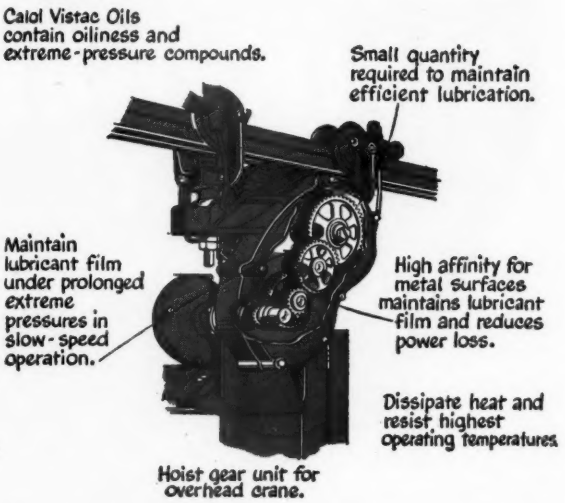
Calol Gear Compounds contain oiliness and extreme-pressure additives which prevent welding, scoring and excessive wear of gears operating in hard service, and contain a special inhibitor which eliminates foaming.

They are non-corrosive, retain good body in all working temperatures and minimize leakage from worn gear sets. In worn gears, they also reduce vibration and noise by keeping a cushion-like film in large clearances between the teeth.

Calol Gear Compounds are adaptable to and provide economical lubrication in many types of gear sets and in a wide range of operating conditions.


Calol Gear Compounds meet requirements of a wide range of gear types and operating conditions.
High viscosity reduces leakage loss in worn gear sets.
Oiliness and extreme-pressure additives prevent welding, scoring and extra wear.
Special inhibitor prevents foaming
Calol Gear Compounds are made in eight viscosity grades.
Will not corrode metal.

Air-cooled worm-gear Speed reducer.


Calol Vistac Oils contain oiliness and extreme-pressure compounds.
Small quantity required to maintain efficient lubrication.
Maintain lubricant film under prolonged extreme pressures in slow-speed operation.
High affinity for metal surfaces maintains lubricant film and reduces power loss.
Dissipate heat and resist highest operating temperatures
Hoist gear unit for overhead crane.

Viscous and tacky oils keep tough film on gears

Heavy duty gears, such as industrial reduction sets, with forced-feed or gravity lubricators, sight-feed cups, bottle- or wick-oilers are safely lubricated with Calol Vistac Oils.

As the name "Vistac" implies, these oils are both viscous and tacky and have a high affinity for metal surfaces. They contain oiliness and extreme-pressure additives and provide a lubricant film of unusual strength. This film resists rupture even on slow-moving gears that develop extreme pressures over a wide area for a relatively long time.

In addition to being outstanding gear lubricants, Calol Vistac Oils are excellent for air hammers, rock drills and other air tools. They rapidly carry away heat, resist high temperatures, stay fluid at low temperatures and atomize quickly. There are six viscosity grades of Calol Vistac Oils:

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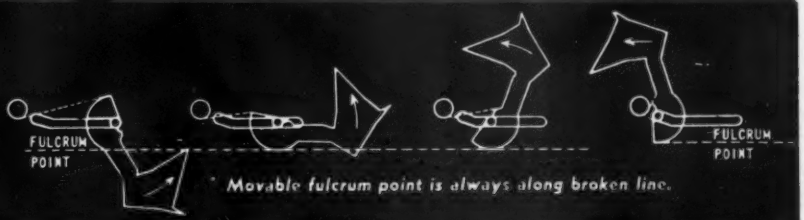

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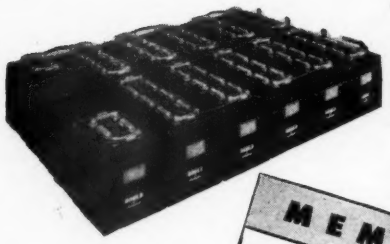

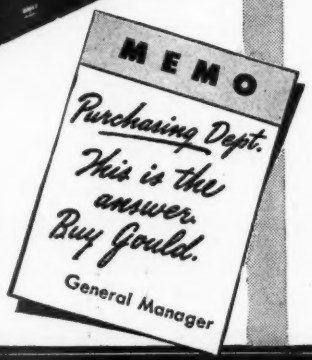

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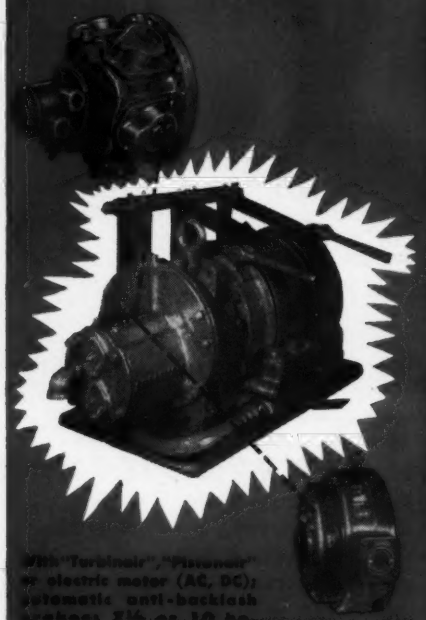

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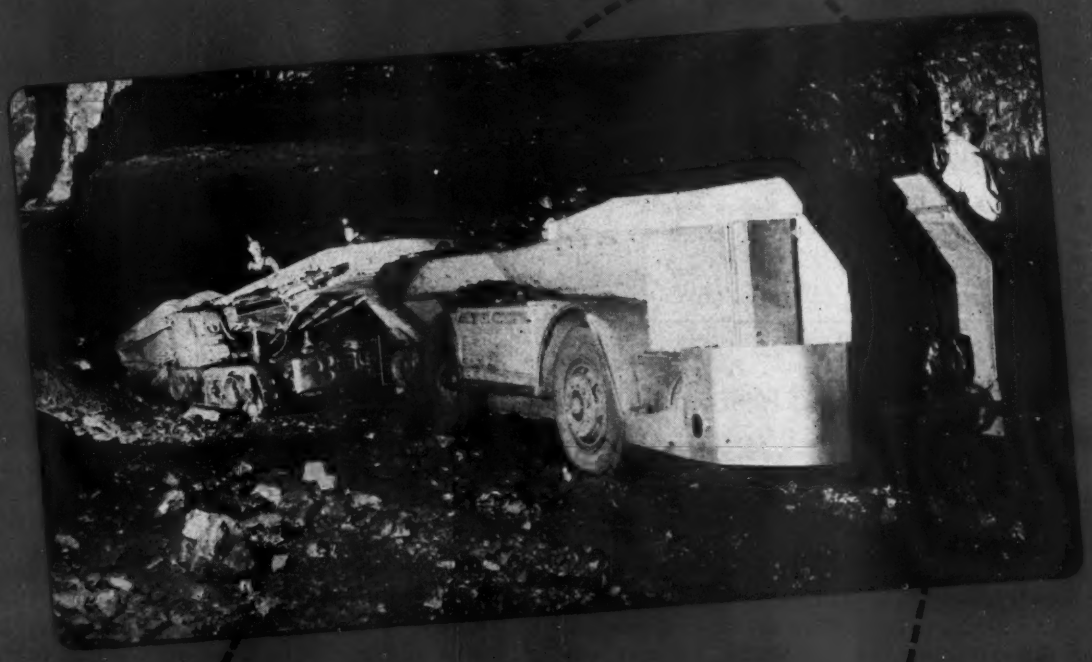

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Mining
CONGRESS JOURNAL

Published for the Entire Mining Industry by The American Mining Congress

JULIAN W. FEISS, Editor

Volume 33 MAY, 1947 Number 5

THE CULT OF THE GREAT WHITE FATHER

THE United States Bureau of Mines, since its inception in 1910, has had a distinguished record of service both to the mining industry and the Nation. Recognized today as the most authoritative source of mining information and the most influential agency engaged in mine safety education, the Bureau's function has, with few exceptions, met the exacting demands imposed upon it by a complex and diversified industry. Although one may not always agree with conclusions reached in some of its reports, the value of the Bureau's many services is not questioned.

The Centralia disaster has revived the demand in certain quarters that the United States Bureau of Mines be granted police powers, including the right to close down mining operations for non-compliance with Federal safety regulations. Apparently it is believed that by centralizing the powers of safety enforcement in Washington, accidents will cease, roofs will not fall in coal mines, explosions will become unknown, and the hazards of the industry will be greatly reduced.

In 1941 the pros and cons of this interesting theory were thoroughly examined by the 77th Congress prior to the passing of Public Law 49, usually referred to as the Coal Mines Inspection Act. It was pointed out, in testimony delivered by competent witnesses, that such authority granted the U. S. Bureau of Mines would not promote safety, would duplicate existing enforcement machinery, and infringe upon State laws.

The Bureau of Mines was never established as a police agency. Its function has been advisory and rightly so. It can and it does formulate standards of mining practice and standards of safety; it recommends the use of permissible equipment after careful testing at its experiment stations; it assists in the training of safety teams and the use of first-aid methods; it has developed new rescue equipment and new rescue methods—many lives have been saved by this splendid work. The Bureau in its safety program has functioned on a high level and in the realm of service alone; the imposing of police powers on this organization would alter completely its constructive character.

Unfortunately, the Bureau of Mines can be transformed into an enforcement body. Congress can probably invoke, as it has in other instances, the welfare and commerce clauses of the United States Constitution (Article I, Section 8) to grant the agency police powers. The relationship of coal mining to interstate commerce, as presently interpreted by the courts, seems to make it subject to Federal jurisdiction.

However, before consideration is given to this ill-advised step it must be remembered that such powers are of no value without the sanction of those most deeply concerned. We strongly suspect that both miners and mine operators would resent interference by a Bureau of Mines policeman. Furthermore, we know from bitter experience that safety cannot be attained underground except through education plus the desire to eliminate working hazards by the men themselves.

Safety is unfortunately not spectacular; preventive medicine is never as dramatic as curative medicine. A policing authority would be unable to eliminate underground casualties caused by carelessness—which unfortunately is the reason for most mine accidents.

The extension of Federal police powers, for reasons of safety within an industry, should be energetically opposed. Such powers can well be extended beyond coal mining alone. During the last twenty-five years motor vehicle deaths on our highways have been fifteen times as great as those in our mines. Accidental railroad deaths and like fatalities in the manufacturing industry have also exceeded those of mining. If the Government is to police our mines, why not our highways, why not our railroads, why not our manufacturing plants?

Finally, important though considerations of mine safety may be, our citizenry must never forget that the vesting of police powers in the hands of a centralized government is the highroad to dictatorship. Realizing this possibility, the framers of our Constitution incorporated the Ninth and Tenth Amendments under the Bill of Rights.

If the Bureau of Mines ever becomes a police agency, there is one man to whom we would extend our most profound sympathy. He would be the true whipping boy of the mining industry. On his shoulders would fall the weight of Federal enforcement. He, and he alone, would be held ultimately responsible in the event of a serious mine catastrophe. His only solace would be derived from a streamlined chrome-plated wailing wall, contributed by the president of the United Mine Workers. He is some future Director of the United States Bureau of Mines.

Framed timber for stopes is loaded into a supply skip

★

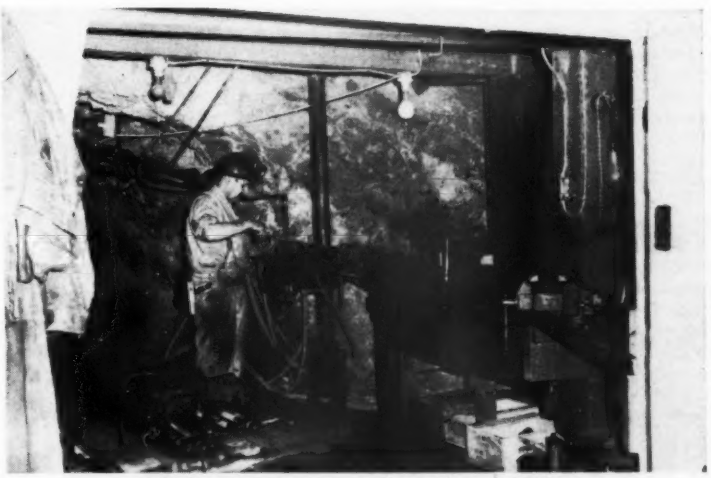
By C. HYDE LEWIS

Superintendent
New Idria Quicksilver Mining Co.

★

Underground Mechanization at New Idria

Despite Current Quicksilver Market Conditions, High Wages, and Increased Supply Costs, Mechanization and the Use of a Tandem Slushing System Has Increased Production at this California Property



Minor repairs are made in this underground shop

IN THE past ninety-odd years of mining quicksilver ore at New Idria the same basic mining methods have not been changed but mechanization has increased measurably the output of the miner. Because of heavy ground it has always been necessary to mine out small sections of the ore bodies at a time, square-set the openings, and back fill immediately.

The ore occurs under a flat dipping thrust fault in hardened sandstones and shales which has been pulled apart by cross-faulting, thus forming lenses. The lenses are spaced along a 2-mile length and rake diagonally down under the thrust fault giving them a dip of only 20 to 30 degrees. The ore-bodies occurring in these lenses are very irregular but are often several hundred feet long, 30 to 50 ft. thick, and extend down under the hanging wall from level to level. The thrust fault hanging wall is composed of a heavy gouge over 50 ft. thick, and as it dams up considerable water, care is taken to hold the gouge in place and not allow it to cave.

Although square-setting is still used, machines have aided in the transportation of men, supplies, ore and waste, in the breaking of the rock, in the ventilation of the mine and in the distribution of water, compressed air and electricity.

Men are transported from the portal of the lower main haulage tunnel either directly underground on trains or taken to upper tunnels in buses. In the mine they are transported in skips from the tunnels to the stopes. By careful routing, all men can be at their working faces in 15 minutes. At noon they are allowed

30 minutes for lunch on company time and a 50c hot lunch is served at a central location near their working places. All men start from the portal of the lower tunnel at the beginning of the shift and are back at the starting point eight hours later.

Supplies and timber are brought into the mine through a tunnel near the top of the ore bodies. Supplies are then transferred to small 3 x 8-ft. supply skips which slide on rails in flat incline raises. One or more of these raises connect with each stope and are usually driven near the hanging wall so that the heavy timber is delivered to the top of each square-set floor. The rails are all standard 18-in. gauge so that cars, timber trucks, car loaders, and jumbos can be easily moved between levels. The skips are raised and lowered by electric or air driven single drum, one-ton capacity hoists. Air-driven multiple cylinder reversible hoists, with the clutch locked in, have been found to be safest and easiest to operate. Half-inch 8 x 19 regular lay plow steel wire rope is used.

Centrally located on the supply level near the stopes are the mine foreman's office, powder and fuse magazines, supply depot and shop where all minor repairs of drills, haulers, carloaders and hoists are made.

Ore is transported from below the present stoping areas nearly a mile through the lower tunnel to the crusher at the surface. Three-ton cars and battery locomotives are used. Ore from the stopes is scraped down long inclines and dropped through raises to the haulage level.

Scrapers Made in Company Shop

The longest incline driven to date is 670 ft. long and is on a 24-deg. slope. It was cut upward in the footwall from a main ore pass to a point under a large stope. As the ground was heavy it was driven small and timbered. This opening would accommodate a small scraper only, and with limited rope speeds, the desired tonnage could not be handled with one scraper. Consequently, four units, 36 in. wide, were equally spaced along the 670 ft., fastened front to back tandem fashion so that they would move together, each scraper moving the ore a quarter of the distance. These units are hauled at a speed of 280 ft. per min. by a 20-hp. electric hauler. All the cables are ½-in., 6x19 regular lay plow steel wire rope with independent wire rope centers. The back haul cable is supported by rollers so that it runs along the back of the incline. The first or upper scraper is slightly smaller than the others so that the following units are never overloaded. This tandem hookup is also used to bring waste from the surface through a 600-ft. tunnel for scraper distribution to the top of several stopes. At the portal of this tunnel a three-drum 10-hp. electric hauler with a 36-in. scraper drags surface dirt down a steep hillside into a transfer hopper feeding the tandem unit.

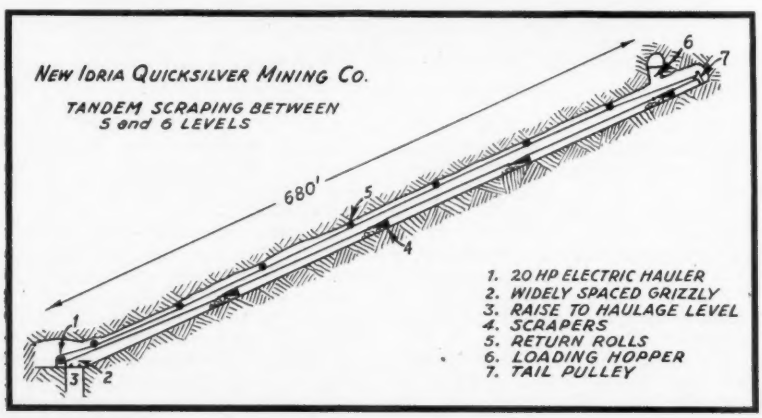
This light 30-inch scraper was made at the company shop

These 36-in. scrapers are made of ½-in. A. R. Steel and are fabricated in the company's shops. The three shoes forming the cutting edge are purchased from a scraper manufacturer and are bolted to the curved back. These shoes are of manganese steel, wear well and are easily replaced in the mine without removing the scraper.

Scrapers Used for Servicing

It has been found that small drifts can be run cheaper and faster by drilling off a conventional bar and arm and by using a scraper to handle the muck, than by the use of jumbos, car loaders and cars. Also, inclines up the flat dip of the orebodies can be driven as easily as on the level except for the handling of machines, tools, and timber. This difficulty has been remedied by unhooking the scraper and substituting a scow shaped light steel sled which weighs only 150 lbs. but which is large enough to hold bar, arm, drill machine, steel, hoses and tools for drilling or a set of timber. Men also ride up and down on this sled but it is somewhat rough going. In heavy ground conventional drift sets are used in the low angle inclines but with stronger collar braces. One incline has been sunk 160 ft. with a scraper pulling the ore up a 26-deg. slope. A drifter mounted on a crossbar was used to drill the face. A little more hand mucking had to be done to clean up the face after each round, than would be necessary when scraping on the level or down hill.

Scraper-hauler installations handle all of the ore broken in the flat stopes. Inclines are run up the footwall of the stope in the ore at intervals of 75 to 100 ft. and one or more scrapers



are used, depending on their length. On long runs 10 to 20-hp. electric haulers are used. On short runs air haulers are usually used. To feed these inclines, small scrapers and haulers cross drag the ore in the square set stopes. As flexible units are desirable, a light scraper weighing only 140 lbs. has been built in our shops. The curved back is 30 in. wide and is made of ⅜-in. A. R. Steel plate and the two bales are standard 2-in. pipe bent in an easy curve in such a manner that the scraper cutting edge is prevented from hooking the square set posts. The cutting edge is hard faced and lasts six months. These light scrapers are connected to a small hauler which weighs only 300 lbs. when mounted on a specially made sled. The deck of the sled to which the hauler is bolted is made of ¼-in. plate 18 in. long and 24 in. wide. This deck is welded to two runners made of 3-in. pipe 4 ft. long and turned up at each end. Holes are drilled near the pipe ends for moving the unit and the sled is easily locked in place in the square set by placing a timber across on front of the runners and another across on top of the back runners.

Small double drum haulers are mounted on sleds

Cable Selection Important

The use of the correct size and type of wire rope is important and it is always a compromise between a large cable with thick wires, that will stand the wear from dragging through the broken rock and will minimize breakage due to sudden jerks and kinking, or a smaller cable which will wind on the drums and sheaves without undue flexing. If hauler manufacturers would increase their drum diameters 50 per cent on all of their products, a considerable saving could be made by the operator on his wire rope costs. At Idria, all cables used on scrapers are 6 x 19 regular lay plow steel wire rope with independent wire rope centers. In the stopes ⅜-in. diameter cable is used and on the longer hauls 7/16 and ½-in. diameters. On the supply skips where there is little wire wear a more flexible ½-in. diameter 8 x 19 regular lay plow steel wire rope with a hemp center is used.

The tail sheave wheel on the permanent scraper installations is 2 ft. in diameter and is bolted to two vertical timbers. On the smaller scraper runs, 12-in. swivel tail blocks are used.

The return cable on the tandem runs is held up by horizontal rollers. Standard hauler cable guide rollers are purchased, fitted with brackets and bolted to the tunnel caps at 50-ft. intervals. These rollers are of chilled steel, are easily lubricated and wear for years. The rollers are 7-in. long and allow knots in the cable to pass through. These light weight small-diameter rollers change rotation quickly with the change of cable direction causing little slip and wear on the cable.

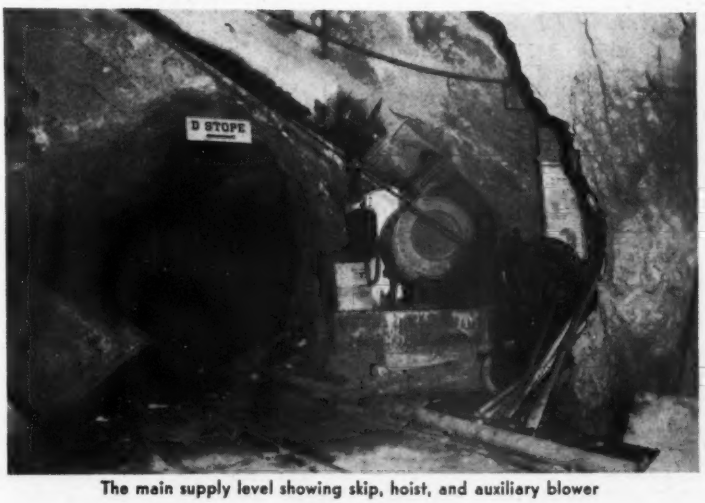
Rollers on the skip inclines are made by cutting out 3-in. disks from old conveyor belts, mounting them on a shaft and holding them firmly together with end plates and bolts. The bearings are bronze and are lubricated with a grease gun. The belting cords on this laminated roller give a rough surface which quickly starts the roller turning when the cable touches.

Although the small size of the drum on the haulers has been criticized, because of the necessity of using small cable, a compact machine is important when the unit must be moved through small openings in the mine. The cost of moving a unit out of the mine for repairs is also a considerable expense and it should be stated that the hauler manufacturers have built very compact and sturdy machines. Many of the Idria haulers have been running longer than five years without having any attention given them except lubrication.

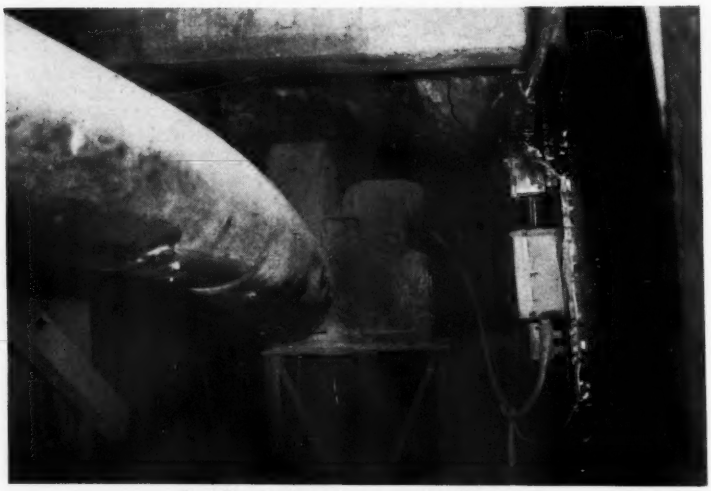
Three-Inch Drifters Used Throughout Mine

In driving main tunnels the ground is drilled with two 3-in. drifters mounted on a jumbo and the mucking is done by car loaders. Electric battery locomotives are used to haul the cars.

Drilling is done with 3-in. drifters and medium sized self-rotating stopers using 1⅛-in. round steel with lugs. Detachable bits starting at 2¼ in. are used. The ground drills easily but is ravely and rocks drop down behind the bit. Practice has shown that with large bits and lug shanks the drill rods can be more easily removed from the hole. The rough holes are hard to load, often tearing the paper on the



The main supply level showing skip, hoist, and auxiliary blower



Portable steel stands are used with blowers

Mechanization No Longer on Trial

Today there are fewer miners underground because they accomplish more by using machines. The miner is supplied with machines, tools and timber and seldom leaves his working face. He is usually given a mucker as a helper. Muckers handle supplies and scrape or tram ore and waste. On the same rate of pay as the miner is the mechanical crew which repairs all machines, moves blowers and haulers, puts in pipe and does necessary welding. Experience has shown that if a workman is given a clean, well ventilated working place and sufficient tools, so that he can accomplish a full day's work without becoming exhausted, he is in the right frame of mind and anxious to make a showing each shift. Labor costs have been cut appreciably by supplying good machines and good working conditions. The use of mechanization makes it possible to mine under current market conditions even with the high wages and high cost of supplies.

powder so the more plastic straight 30 per cent gelatine is still used. For the same reason the new collapsible cartridges are not used. The rock has no silica to cut the gauge of the bit and an average of 15 ft. of drilling is obtained from each bit before sharpening by hot milling.

Compressed air is brought into the mine in a 6-in. pipe and then distributed to the stopes. Two-in. pipe is installed with standard pipe fittings but all 3, 4, and 6-in. pipes have welded joints and fittings and the turns are made by wrinkle bending. An armored cable brings electricity at 2300 volts 5000 ft. underground to the stope areas. The power is then reduced to 440 volts for operation of blowers, haulers and hoists. Small dry transformers are also spaced through the mine to supply 110-volt power for special lighting. Three wire weatherproof receptacles and plugs are used throughout the mine wherever 440-volt power is needed. After the electricians have once installed the receptacle any workman underground can move or replace a blower, hauler or hoist by merely pulling out the plug. An electric welding set also can be plugged in for welding in the vicinity of any receptacle.

An underground lunch room is provided

Thorough Ventilation Required

As the mine gives off some methane gas and the oxidation of the pyrite in the rock gives off considerable heat, it is necessary to thoroughly ventilate all working faces. Air is circulated through the mine by a positive blowing fan at the portal of the lower haulage tunnel. The tunnel is used as the air duct and an automatic door allows passage of the ore trains. Exhaust fans at the portals of two upper tunnels complete the basic ventilating system. Throughout the workings electric blowers are used as booster fans with air locks and as auxiliary blowers with 12 and 16-in. ventube to supply air to drifts, headings, raises and other areas not in the main air stream.

The Airborne Magnetometer in Use

Geophysical surveys with airborne equipment are being made of the Prescott, Bagdad, and San Manuel districts of Arizona by the United States Geological Survey. The field party of four is headed by William J. Dempsey, geophysicist. Others in the crew are: Mary E. Hill, observer; R. C. Hegy, pilot, and Joe L. Lamping, copilot. They are working in cooperation with Charles A. Anderson, geologist for the Geological Survey stationed at Prescott.

The magnetometer cannot detect copper and other metals as such. It can only detect nonferrous minerals by structural association, or by association with ferrous minerals. Thus the geophysicist must work with the geologist and also with the known geology.

The records of the reconnaisance flights over the three Arizona areas will be taken to Washington where they will be charted and interpreted. The official reports then will be placed in open files at Washington and at district offices of the Geological Survey for inspection and study by those interested.

High Production from Track Loaders and Large Cars

At the Osage Mine in Northern West Virginia, Track Loaders Combined with Track Cutters and Eight-Ton Cars, Are Making an Excellent Record in Tonnage Production and Pillar Extraction

By HARRY HINES

Superintendent
Christopher Coal Co.

A COAL property in northern West Virginia has had an interesting history, which may be divided into three eras, each one representing a stage in the transition of coal mining from hand to mechanical operation. Opened some years ago by the Osage Coal Co. and originally worked with hand loading, the entire out-crop frontage was completely mined out in the 1930's. There was a large acreage of solid coal behind the mined area, but it was believed that this territory could only be reached by a new opening, either a shaft or slope. The property was therefore abandoned and the first phase of its history was completed.

Some years later, in 1939, Mr. Frank Christopher, president of the Christopher Coal Co., purchased the property and, against all precedent, drove a main haulage way through the abandoned and caved area into the solid coal beyond. This was quite an undertaking, but it was successfully completed and the second phase of the mining of this property was started in 1940. The new operation, as described in the September, 1941, MINING CONGRESS JOURNAL, was 100 per cent mechanized and was projected for the retreating block system. According to this plan, the panel entries were to be driven to their barrier limit before rooms were started and the main entries were to be developed as rapidly as possible so as to reach the property boundary and put the mine on full retreat. This plan was followed and the subsequent operation established the fact that mechanical loading was practicable for the complete cycle of mining, from the entry development to the pillar recovery.

In November, 1946, the property was purchased by the Pittsburgh Consolidation Coal Company and the mine has now entered into its third and final phase which is that of full retreat. Using track mounted Goodman loaders, Jeffrey track cutters and Differential 8-ton cars, the pillars are mined to a high percentage of extraction—from 85 per cent to 90 per cent under normal conditions. There are, however, some areas where coal must

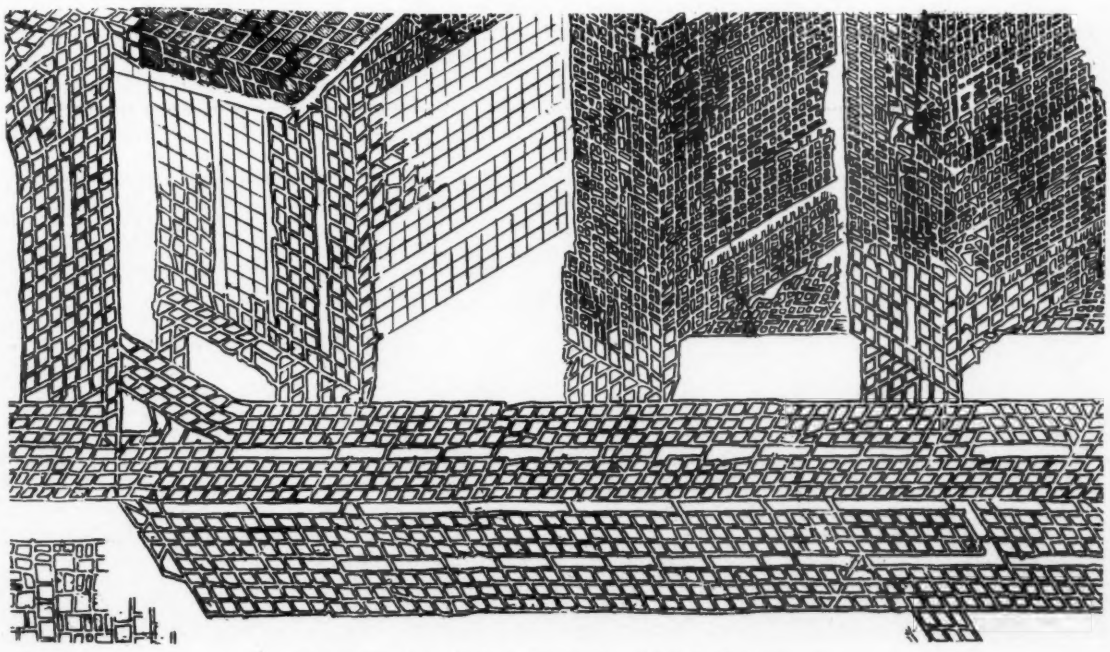


Fig. 1. Mine map showing entry development and pillar recovery

be left as protection against overlying workings as will be described later.

Mining Conditions Favorable

The seam mined is the Pittsburgh, which has a total thickness of about 8½ ft.; however, 12 in. of top coal is left to support a tender drawslate roof, making an average mining height of 7 ft. The cover is light so that excessive weight is not encountered in the pillar workings and, in general, mining conditions are favorable.

A part of one section of the mine is shown in Fig. 1, which illustrates the complete system from the entry development to the pillar recovery. Main entries are driven sixteen in parallel on 81-ft. centers and are connected with cross cuts on 78-ft. centers. The room entries or cross headings are driven eight in parallel on 81-ft. centers with cross cuts on 78-ft. centers. These sections are separated by 300 ft. of coal; this coal being developed, as needed, in advance of the pillar line by rooms on 81-ft. centers and connected with cross cuts on 78-ft. centers.

All entries and cross cuts, both main and room, are driven 14 to 18 ft. wide with cross cuts turned on a 60-deg. angle. A 50-ft. barrier pillar is left on each set of cross headings. This is done so that each section is furnished fresh air, regardless of how many cross sections are working off the main entries. After the section is worked out, this barrier pillar is recovered when the adjoining section is retreating.

The blocks of coal that are left after the entries are driven to the extreme boundary measure 60 ft. by 63 ft. These blocks are taken on retreat, the pillar line or break line, being maintained on a 45-deg. angle across the entire section. Recovering the diamond-shaped blocks consists of pocketing 18 ft. wide across the end, leaving a thin fender against the gob, until the pillar is worked down to a triangle. Pockets then are driven through this triangle as in Fig. 2, leaving small stumps which are either recovered or shot.

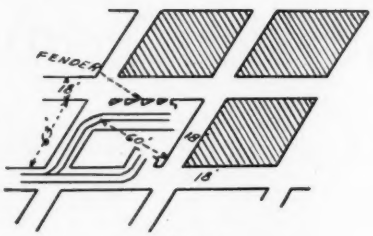


Fig. 2
High pillar recovery

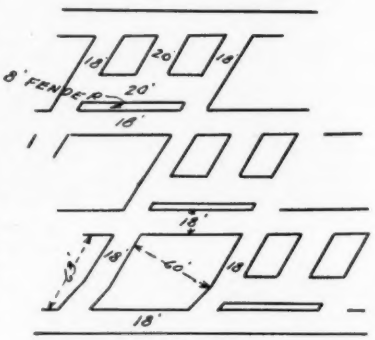


Fig. 3
Pillars partially mined

The Sewickley seam lies over the Pittsburgh and, when it is mined out, large bodies of water accumulate. Pillaring is not feasible under these conditions and the blocks of Pittsburgh coal are stumped as in Fig. 3, leaving enough coal to support the cover between the two seams. Recovery of coal under these conditions averages from 65 to 70 per cent and, unfortunately, much of the remaining acreage in the Osage mine will be working under Sewickley coal which has been mined out.

Track-Mounted Machines Used

In overcoming obstacles that are potential handicaps to the satisfactory performance of a loading machine, the Goodman track mounted loader, designed especially for this system of mining, has demonstrated its adaptability and effectiveness. Its ability to work in close posting, nosing in between timbers, is a decided advantage. See Fig. 4. During the removal of the slabs the machine must load from the side, and this system of mining requires that the machine load on curves, which these loaders are well able to do because of the liberal range of movements of the gathering head and discharge conveyor. See Fig. 5. The lined-up discharge of the rear conveyor, which can be suited to the height and location of the mine car, is an additional advantage in the use of these loaders. The operator is always in a safe position, as the controls are located 15 ft. to the rear of the front end of the gathering head.

The coal is top cut and sheared with the track mounted cutting machine, there being one of these machines to work with each loader. Shearing in line with the right rail gives the best results as this location of the shear permits the shot holes to be so placed as to facilitate the mechanical loading. The top cutting also protects the tender roof.

Hand held electric drills with augers 9 ft. in length are used for drilling shot holes. Two holes are drilled in each place. The holes are started 10 to 12 in. above the pavement and angled down so that the hole hits the pavement 6 in. from the back of the cut. The holes are placed 2 ft. from

Fig. 4. Loader well protected by timbering

each rib. Permissible powder is used for blasting.

Five cross bars on 4-ft. centers are set in each working place. If bad top conditions are encountered, additional timbering may be necessary to make the place safe. This is always done before loading or cutting crews enter.

Rock dust is applied liberally with rock dust distributors throughout the workings and along the haulage ways. Water sprays are used with the cutting machines while they are in operation to prevent the suspension of coal dust in the air.

The machines load directly into mine cars with 8-ton gathering locomotives equipped with cable reels. These serve the machines, handling three to four cars in each change. The tramming distance while the locomotive is serving the loaders is short, as switches are laid simultaneously with the necking of the cross cuts or rooms. All rail in the working sections is 40 lb. Side tracks are kept close to working face and an intermediate locomotive delivers empty cars to the side track and takes loaded cars to make up trips for main line locomotives.

The mine works three shifts a day and in 1946 produced 996,000 tons. A normal crew for each section as shown below will load an average of 350 tons per shift.

1—Loading machine operator
1—Loading machine helper
1—Cutting machine operator
1—Cutting machine helper
1—Motorman
1—Brakeman
2—Trackmen
1—Shotfirer
2—Timbermen
1—Face Boss

12 Men—Total

Large Capacity Trips on Main Line

The mine is a drift opening; the average main line grade is 1½ per cent against the load and the average haul is three miles. Goodman 15-ton locomotives are used on the main line where an average trip consists of 16 cars; two locomotives are used for each trip, one in front and a pusher in the rear. The main line track is laid with 85-lb. rail, while the secondary haulage ways have 60-lb. rail.

Two hundred Differential cars, 8-ton capacity, rotary dump type, bring the coal from the working faces to the tipple, which is only a short outside haul from the mine portal. (See. Fig. 6.)

The coal is surveyed from the rotary dump bin to the screening equipment by an elevating chain belt conveyor after which it passes over the picking tables and loading booms to the railroad cars.

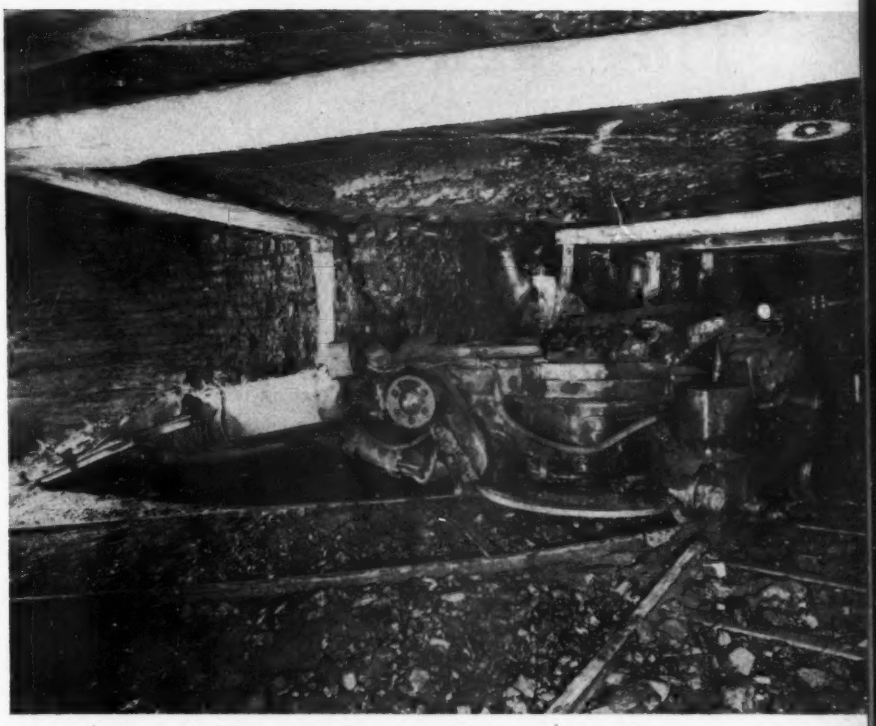


Fig. 5. Loader operates well on curves to turn rooms and entries

One of the best machine shops in this district is located adjacent to the tipple. This large concrete structure houses the following equipment; one 15-ton traveling crane, five lathes, one milling machine, one 100-ton hydraulic press, electric and gas welding units, and an armature winding shop. It is double tracked and has space for six loaders or cutting machines. The maintenance foreman's office and supply house for storage of machine repair is also in this building.

Fig. 6. Sixteen 8-ton cars constitute the average main line trip

The Saga of Red Mountain Iron

★

By

A. A. NILSEN
Ore Beneficiation Engineer

and

ROY YINGLING
Superintendent
Ore Conditioning and Sintering Plant
Tennessee Coal, Iron and Railroad Company

★

Although iron deposits in our Southern States were worked in a small way as early as the American Revolution, the development of large-scale iron mining in the Alabama region is of comparatively recent origin. Systematic prospecting began in 1901 and thirteen years later scrapers were experimented with underground—a pioneering venture at that time. Red Mountain did not grow from a shoestring—its present place in the iron mining industry is no accident. Today's operation is the culmination of able planning, the application of efficient engineering methods, and the skillful use of mechanical equipment.

THE Tennessee Coal, Iron and Railroad Company owns and operates eight red ore mines along the crest of Red Mountain, located between Birmingham and Bessemer, Ala., as shown in Fig. 1. These are grouped into three divisions, Ishkooda, Wenonah and Muscoda, each division being separated by properties owned by other companies. Limestone is also mined from a stratum 330 ft. above the so-called Big Seam ore deposit, and in the case of the Muscoda mine both stone and ore are mined at the same location as indicated in Fig. 2.

In the early days, little thought was given to prospecting to determine the extent of workable ore, but in 1901 systematic prospecting was begun. Fig. 3 shows a profile of the No. 14 slope at Ishkooda. Many faults have been encountered in the course of mining operations and underground diamond-drill holes have been used to supplement the surface drilling in these areas. Available reserves were estimated from the survey and the cores have furnished accurate guides in forecasting the analyses of the ore as mined.

Scrapers First Used in 1914

Many developments have been pioneered by the company in their mining practices. For example, in 1914 experimental work was begun with a scraper hoist and by 1916 two double-drum electrically driven mechanical loaders were in operation scraping the broken ore from the working face over ramps into two-ton tram cars. In 1922 there were 10 loaders of this type in operation, more heavily constructed and powered by 50-hp. direct-current motors instead of the 30-hp. alternating-current motors used on the first scrapers (Fig 4).

Stopes are mined from either two or three upsets turned from the headings, with 20-ft. pillars staggered throughout the stope. Fig. 5 shows a typical stope at Muscoda. Ordi-

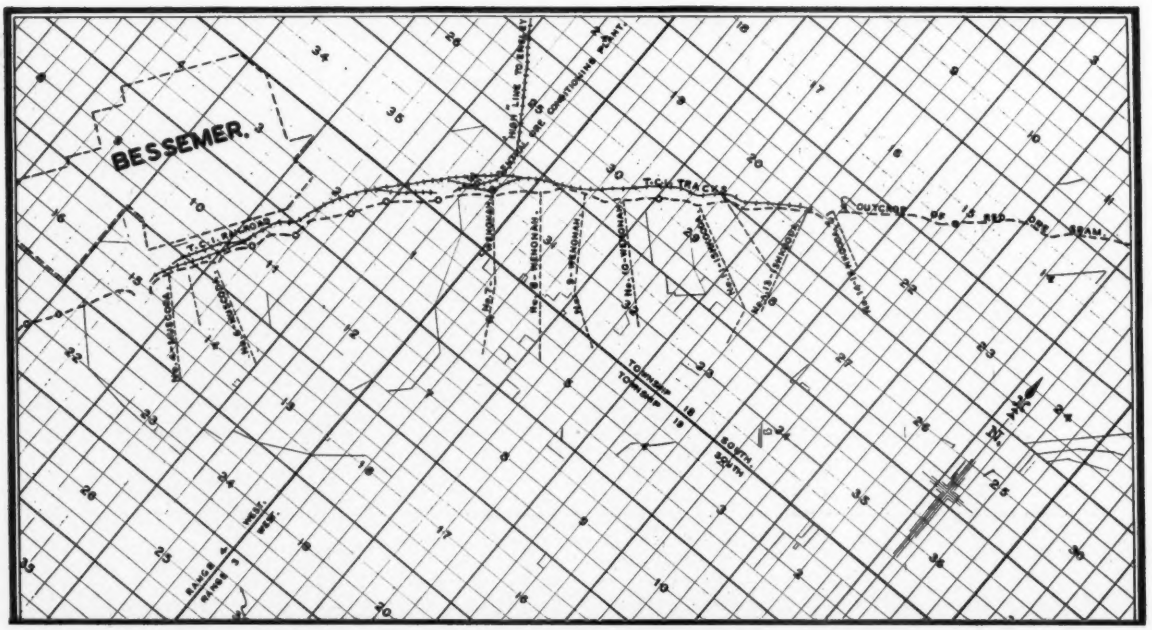


Fig. 1. Location of Iron Mining Operations near Bessemer, Alabama

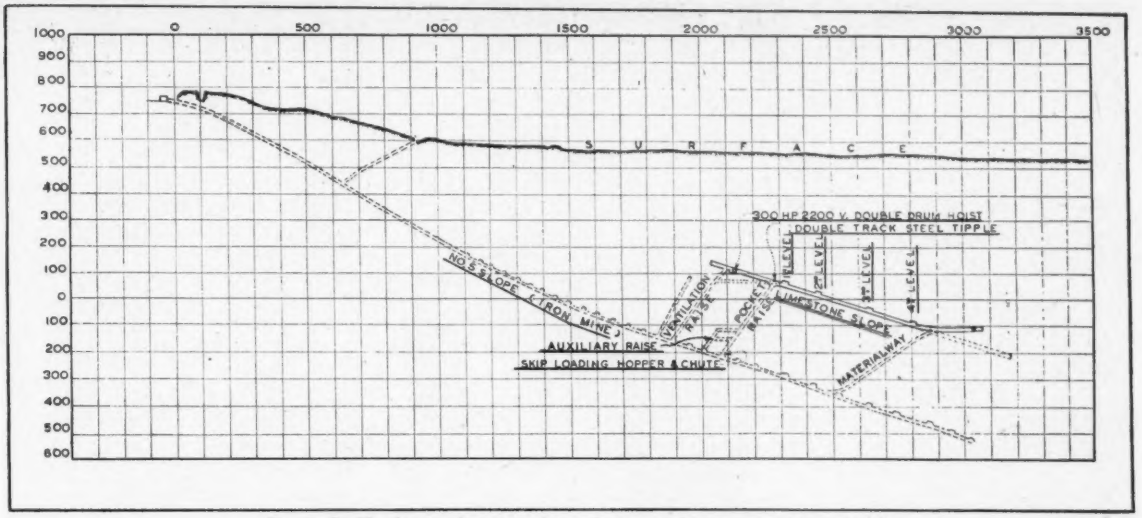


Fig. 2. Profile showing location of ore slopes and limestone at Muscoda Mine

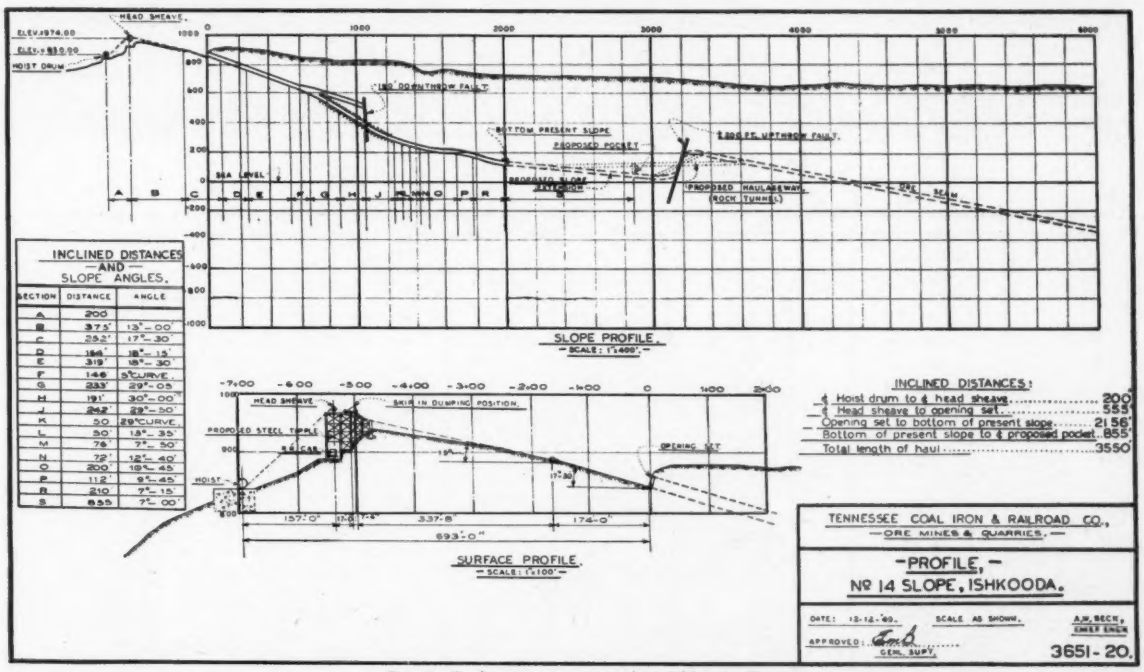


Fig. 3. Faults are encountered at Ishkooda Slope

narily, approximately 16,000 tons of ore is recovered in a two-upset stope. An engineer's pillar separates each stope in a heading. The width of this pillar depends upon the depth of the overlying cover and the crushing strength of the ore, determined by the U. S. Bureau of Mines as being 13,000 lbs. per square inch. A safety factor of 4.3 is used in laying out the pillar system.

Mining operations are planned so that a face can be advanced enough to open a new stope while the operating stope is being mined. Broken ore is scraped from the advancing faces and stopes by double-drum scraper hoists over steel loading ramps into five- and six-ton, all-steel mine cars. Twenty-ton electric trolley locomotives take these cars in trips of six to the main haulageway and rotary dump (Fig. 6).

Here the ore is discharged into an ore storage pocket, which varies in capacity from mine to mine. From the pocket it feeds through measuring hoppers, with air-operated gates into hoisting skips which deliver the ore to the tipples for loading into 70-ton railroad cars. These take it over the company's railroad to the ore-conditioning plant, where it is crushed, screened and blended for use by the blast furnaces at the Ensley and Fairfield plants of the company.

Crushing, Screening, and Blending

This ore-conditioning plant was put into operation in 1941 and consists essentially of three parts, one for crushing and screening the raw ore

Fig. 4. A drag loader as developed for ore loading at T. C. I. mines

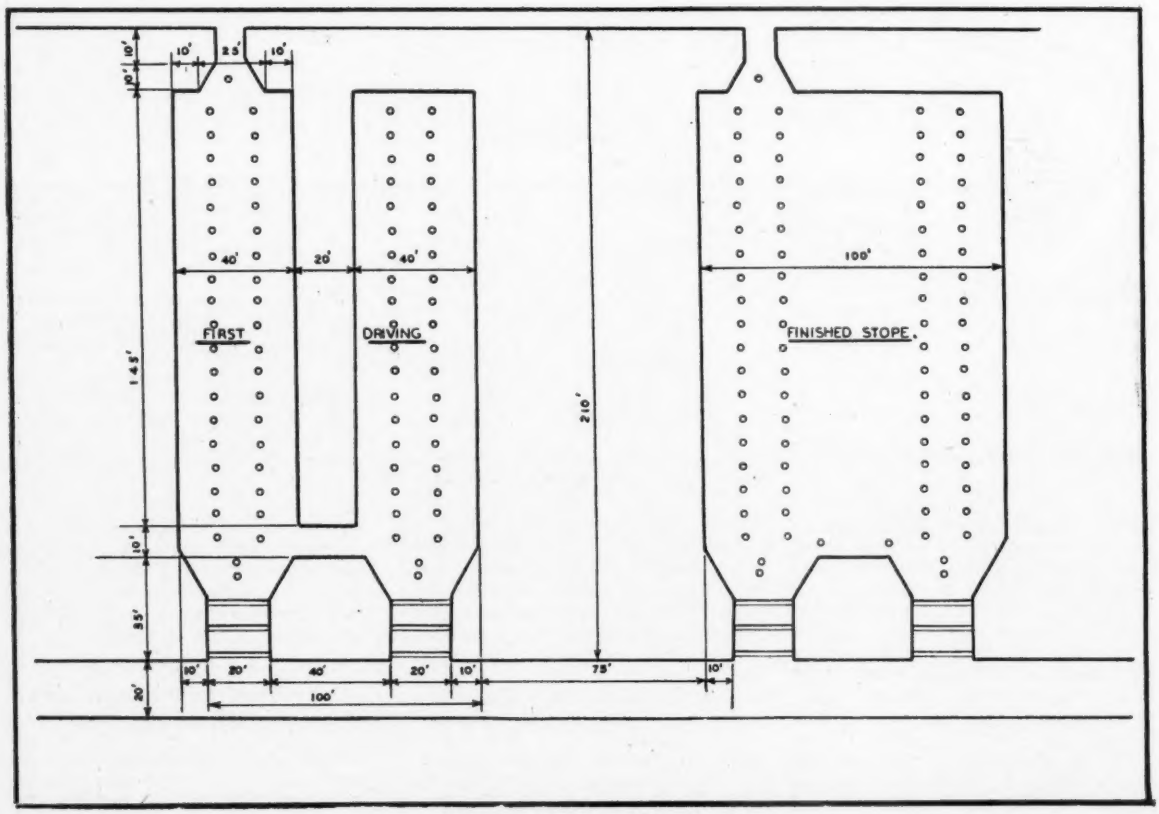


Fig. 5. Typical stope—Muscoda mine

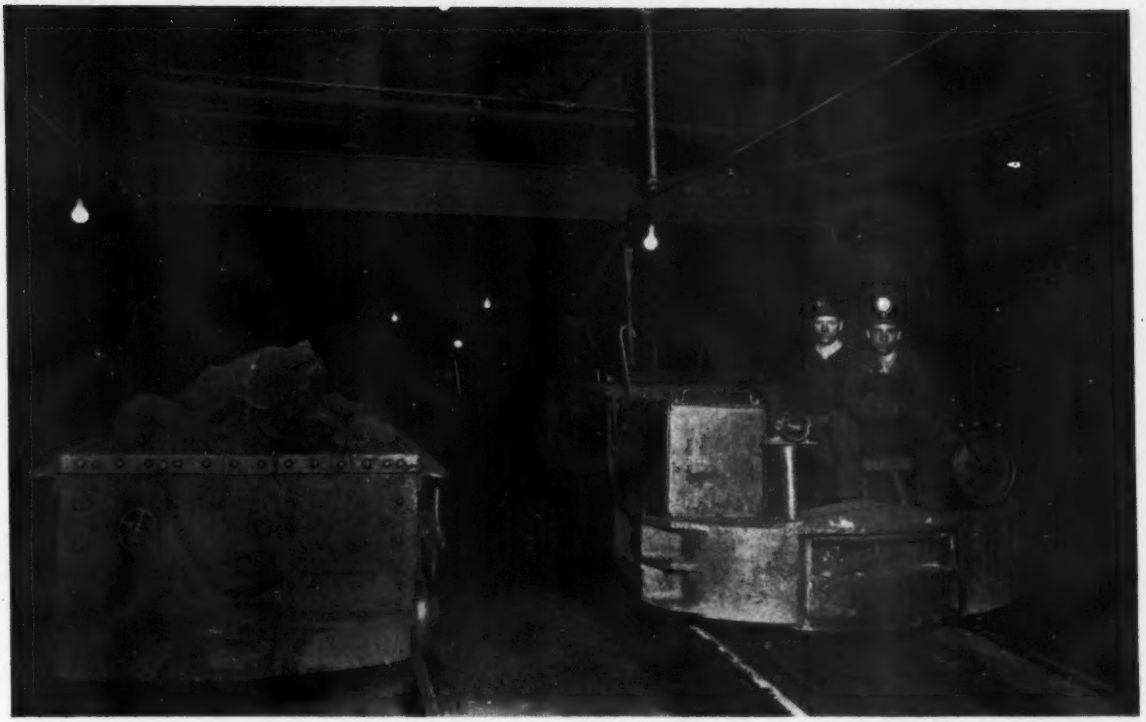


Fig. 6. Note use of I beams for support on haulage way

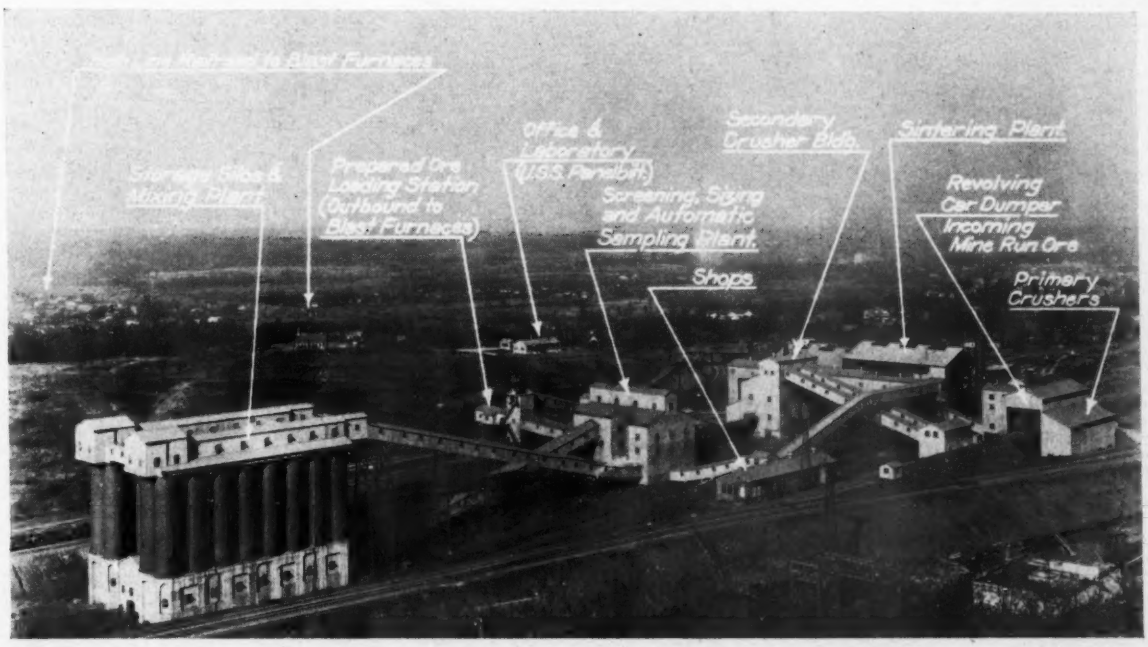
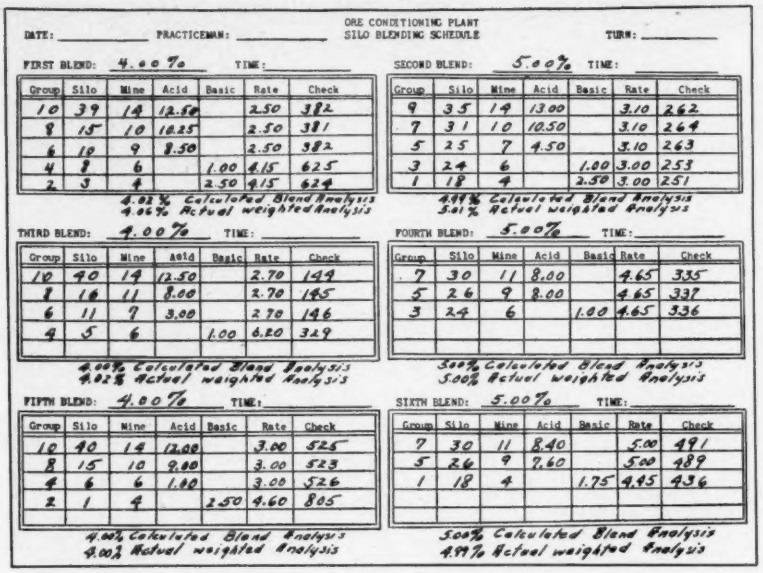

Office & Laboratory (U.S.S. Panelbit)
Secondary Crusher Bldg.
Sintering Plant
Prepared Ore Loading Station (Outbound to Blast Furnaces)
Screening, Sizing and Automatic Sampling Plant
Revolving Car Dumper Incoming Mine Run Ore
Shops
Primary Crushers

Fig. 7. The ore conditioning and sintering plants showing complete layout



ORE CONDITIONING PLANT
SILO BLENDING SCHEDULE

DATE: _____ PRACTICEMAN: _____ TURN: _____

FIRST BLEND: 4.00% TIME: _____

Group	Silo	Mine	Acid	Basic	Rate	Check
10	39	14	12.50		2.50	382
8	15	10	10.25		2.50	381
6	10	9	8.50		2.50	382
4	8	6		1.00	4.15	625
2	3	4		2.50	4.15	624

4.02% Calculated Blend Analysis
4.06% Actual weighted Analysis

SECOND BLEND: 5.00% TIME: _____

Group	Silo	Mine	Acid	Basic	Rate	Check
9	35	14	13.00		3.10	262
7	31	10	10.50		3.10	264
5	25	7	4.50		3.10	263
3	24	6		1.00	3.00	253
1	18	4		2.50	3.00	251

4.99% Calculated Blend Analysis
5.01% Actual weighted Analysis

THIRD BLEND: 4.00% TIME: _____

Group	Silo	Mine	Acid	Basic	Rate	Check
10	40	14	12.50		2.70	149
8	16	11	8.00		2.70	145
6	11	7	3.00		2.70	146
4	5	6		1.00	6.20	329

4.00% Calculated Blend Analysis
4.02% Actual weighted Analysis

FOURTH BLEND: 5.00% TIME: _____

Group	Silo	Mine	Acid	Basic	Rate	Check
7	30	11	8.00		4.65	335
5	26	9	8.00		4.65	337
3	24	6		1.00	4.65	336

5.00% Calculated Blend Analysis
5.00% Actual weighted Analysis

FIFTH BLEND: 4.00% TIME: _____

Group	Silo	Mine	Acid	Basic	Rate	Check
10	40	14	12.00		3.00	525
8	15	10	9.00		3.00	523
4	6	6	1.00		3.00	526
2	1	4		2.50	4.60	805

4.00% Calculated Blend Analysis
4.00% Actual weighted Analysis

SIXTH BLEND: 5.00% TIME: _____

Group	Silo	Mine	Acid	Basic	Rate	Check
7	30	11	8.40		5.00	491
5	26	9	7.60		5.00	489
1	18	4		1.75	4.95	436

5.00% Calculated Blend Analysis
4.99% Actual weighted Analysis

Fig. 8. A silo blending schedule insures careful control

into coarse, medium and fine sizes, another for separating, stocking, and blending the coarse and medium sizes, and the third for stocking, blending and sintering ore fines with flue dust and coke breeze. Fig. 7 shows an over-all view of the entire plant.

Two gyratory crushers take the incoming raw ore in two-car lots from a rotary dump and reduce it to 5-in. maximum, discharging over a pair of 36-in. belt conveyors which carry the crushed ore to surge bins in the secondary crusher building. Here four cone crushers break down the ore for blending. Open hearth charge ore, usually from the Wenonah mine, is screened out by a 4-in. vibrating screen over one of the secondary crushers and by-passed over a series of belt conveyors to a loading bin located over the out-going ore tracks.

All ore passing the secondary crushers is taken by a 42-in. belt running under the four crushers to the screening building. Here it is separated on six double-deck vibrating screens into coarse, medium and fine fractions. Belt conveyors carry these three fractions to their respective storage silos, automatic samplers over each conveyor taking continuous samples equivalent to ½ of 1 per cent of all incoming material. Each conveyor, including the one handling heavy open-hearth charge ore, moves over conveyor scales which record by remote control in the silo control room so that a complete record is maintained at all times of the weight of ore delivered to the plant.

Forty 800-ton steel silos, arranged in clusters of four in two banks, stock the coarse and medium fractions for blending, while 23 bins, each with a capacity of 350 tons, handle the ore fines.

Ore Segregation Depends on Acidity

Great care is used to segregate the three fractions from any one mine, since they vary substantially in acidity and all operations are set up in a series of sequences so as to prevent mixing.

The practice man, with the cooperation of the raw material foreman, makes out a schedule for processing ore from each individual mine. When a cut of cars comes to the rotary dump, the operator telephones ahead to advise the various operators what material is coming and then waits for clearance before he begins dumping. Each of these stations, starting with the secondary crushing plant, calls ahead to the succeeding point when his station is ready to receive material. When the silo control room operator receives the all-clear signal he advises the rotary dump operator that he can begin sending ore from the designated mine through the conditioning plant. This process is repeated for each lot of ore from each mine.

To avoid complicating the process of blending, ore is dumped only into empty silos, thus enabling the practice man to make up his blends from definite quantities of ore which has been analyzed. Silos are usually nearly full, but some may contain only 50 or 100 tons and these are, of course, used up in a blend before additional ore is dumped into those silos.

Under each group of four silos is a proportional feeder, so arranged that it can take ore from only one silo at a time. Blends must therefore be made up on the basis of using only five silos at any one time for either coarse or medium ore blends. Fig. 8 shows a blending schedule as furnished by the practice man to the silo control room, the final blend being made to any desired degree of acidity of ore requested by the blast furnaces. A 36-in. belt conveyor takes the blended ore to the car-loading bins shown in Fig. 9.

Fig. 10 shows the silo control room, which is the nerve center of the ore conditioning plant, since the rotary dump operator waits for the "all-clear" signal from this point before starting any mine run of ore. Using the practice sheet as a guide, the silo plant operator opens the silo gates indicated, sets the individual weigh belt indicator dials to the prescribed feeding rate and starts the whole blending sequence in motion. Failure of any belt to carry its prescribed load or any deviation from speed will, if not corrected within one minute, shut down the affected blending line.

Ore Fines Are Sintered

All fines from the ore received at the conditioning plant, together with approximately 1,100 tons of flue dust and coke breeze from the quenching pits, are sintered each day on the three machines installed at the plant. This sintering plant is thought to be the largest of its kind in the United States and consists essentially of three sintering machines, one with an active hearth area of 72 in. x 89 ft. 3 in., rated at 50 net tons per hour, and two units 72 in. x 102 ft., rated at 60 net tons per hour, together with 23 bins for holding ore fines and 10 for stocking flue dust and coke breeze. These bins have a nominal capacity of 250 tons of ore fines or flue dust or 80 tons of coke breeze and are filled by conveyor belts operating over trippers on top of the bins. An automatic sampler at the head of these conveyor belts provides a ½ of 1 per cent sample for analysis so that the practice man will at all times be advised of the contents of the bins which he must blend to assure a sinter of uniform analysis.

Fines and flue dust are blended in much the same manner as are the coarse and medium sizes except that the blend can be assembled from eight bins instead of five silos. The feeder belts can be varied in speed to deliver from 3 to 50 tons per hour. Sinter fines are returned to the feed line before the blend goes to the pug mills which prepare the mix for distribution to the sintering machines.

The three sintering machines discharge to a common loading chute,

all material passing over a 1¼-in. mesh stationary grizzly. Quenching is accomplished by the use of 14 water sprays over the loading chute and 42 more over the cars, water being sprayed on the sinter for the total of about 40 minutes. Sinter from the plant weighs approximately 80 pounds per cubic foot, due primarily to the relatively low iron content of the Red Mountain ore fines. Daily output of the plant is about 4,000 tons, using approximately 3,700 tons of ore fines and 1,100 tons of flue dust and coke breeze.

A novel braking device developed by the company engineering department holds hearth breakage to a minimum. This device consists of two 8-ft. lengths of rail with curved ends, attached to the under side of the machine just in advance of the head sprocket. These rails bear on the under side of the pallet rollers and are held in position by moderately strong spring pressure. The braking action thus achieved holds the hearth together as the pallets pass over the discharge end, preventing the vertical drop which ordinarily causes considerable breakage. As the drive sprocket pulls the hearth back into position, normal spacing is restored by a horizontal separation of the pallets as they come out from under the braking rails.

A Novel Use for Brattice Cloth

Still another plant development is the use of brattice cloth instead of paper when starting up a sintering machine. Each machine is provided with a roll of brattice cloth which can be stretched over the hearth before starting the machine to prevent loss of draft. After ignition the hearth is started in motion and the brattice cloth rolled up again as the sinter bed advances to take its normal draft.

Every precaution is taken around the entire plant to provide the best and safest working conditions. Modern dust-collecting systems are installed throughout and these have afforded a two-fold advantage. In the first place, they greatly improve working conditions and at the same time reduce maintenance. Secondly, they salvage a valuable material, for the very fine dust can be sintered with flue dust or sold as a filler or pigment. During the war a considerable amount of this material was used for filling practice bombs to give both weight and easily visible evidence of where the burst occurred, without need for a heavy, dangerous bursting charge of high explosives.

Gas-fired salamanders assure comfortable working conditions during rainy or cold weather and at the same time serve to reduce the fire and personnel hazard associated with coke- or wood-burning units. Experience shows that the expense involved is more than offset by the saving in man-hours, without considering the elimination of fire hazards. Electric water coolers assure clean, cold water at convenient locations and specially designed sound-proof telephone booths assure satisfactory telephone communication throughout the plant, making possible prompt and accurate transmittal of instructions at all times, even though many of the telephone stations are in locations where the noise level is high.

Fig. 9. The finished product at the bins has been carefully blended

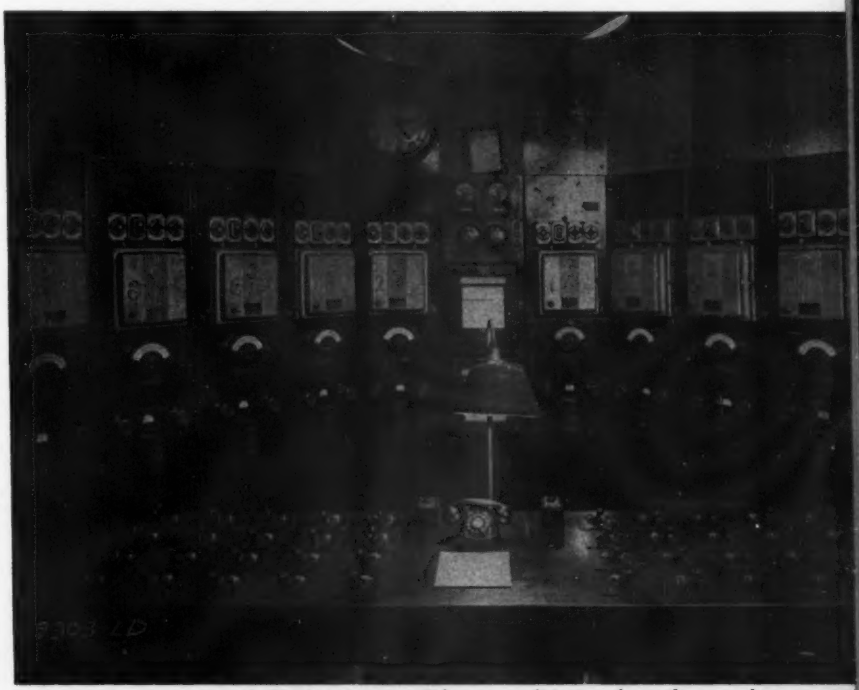


Fig. 10. The nerve center of the ore conditioning plant—the control room

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Comparative Performance Proves Outstanding Superiority!

SUBSTANCE DRILLED	STEEL BITS				KENNAMETAL PERCUSSION BITS			
	FEET DRILLED	TIME MINUTES	No. OF BITS USED	CONDITION OF BITS	FEET DRILLED	TIME MINUTES	No. OF BITS USED	CONDITION OF BITS
SILICA SANDSTONE	198	1210	188	All were worn out	198	308	1	Bit then was sharpened . . . good for much more drilling (See photograph below)
HARDPAN	¼	10	2	Both were worn out	2⅓	10	1	Bit still did not need to be sharpened
LIMESTONE & QUARTZ	¼	10	2	Both were worn out	1⅙	5	1	Bit still did not need to be sharpened
BARRE GRANITE	Bit worn out after drilling 1½"				50	50	1	Bit then sharpened . . . good for much more drilling
HARD SAND ROCK	1	—	1	Worn out	33	—	1	Bit sharpened twice . . . good for much more drilling

KENNAMETAL first set new standards in machining of steel. More recently it has revolutionized rotary drilling, and cutting, in the coal and non-metallic mining industries. Now it brings the "age of cutting with cemented carbides" to pneumatic percussion drilling.

The superiority of the new percussion bit shown above lies in the superlative ability of its Kennametal cutting edge to resist the abrasive wear of drilling through rock substance and at the same time to withstand successfully the pounding of high pressure air hammers.

The statistics in the table have been taken from comparative service studies. Further details are available upon request. The best way, however, to determine what Kennametal Percussion Bits can do, is to try them under the actual conditions that exist on your property. Write for prices and particulars.

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KENNAMETAL Inc., LATROBE, PA.

KENNAMETAL BITS

. . . Before and After Drilling 198 Feet in Hard Silica Sandstone

A new Kennametal Percussion Bit (left) and at the right, same bit after it had drilled 198 feet, in 308 minutes, in hard silica sand rock. It took 188 steel bits 1210 minutes to drill the same footage and they cost almost five times as much as the one Kennametal Bit. All the steel bits were worn out, whereas the Kennametal Bit was still in good condition (see table).

The Heat Pump for Comfort Heating and Cooling

★

By E. R. AMBROSE
Air Conditioning Engineer
American Gas & Electric Service Corp.

★

A complete evaluation of the commercial possibilities of the heat pump is not possible at this stage of its development; much experimentation remains to be done. However, the basic principles of its operation have been understood for nearly a century and have been applied successfully in the domestic mechanical refrigerator. Reduced to simple terms: the problem of heating with this equipment depends upon the economic use of heat given off in the cycle of thermal interchange when the temperature of water or air is lowered. Can this heat be used to warm the home?

The answer appears to be in the affirmative; today experimental units are operating throughout the country on well water. As electric power is required to operate the heat pump, its adoption would increase the coal consumed by the electric utility industry.

THE heat pump has created considerable interest during the past several years among architects, engineers, building contractors, manufacturers, electric utilities companies and home owners because of the possibilities it offers of providing an all-electric self-contained heating and cooling unit for residential use. This is a tremendous potential market for the heat pump when considered from an energy consumption standpoint. For comfort heating alone, during 1940 an estimated 34 million residential installations consumed approximately 5,083 trillion B.t.u., of which 2,382 trillion B.t.u. were assumed to be useful heat. This net or useful energy consumption figure is equivalent to 697 billion kwh. of electric energy on a 1-to-1 conversion basis. If, on the other hand, this annual useful residential heating requirement was furnished by heat pumps having an average coefficient of performance of 4.5, 155 billion kwh. of electric energy would be required—roughly 5¼ times the present total residential electric energy consumption of the entire United States.

Heat Pump Could Increase Coal Consumption

Such an attractive market most certainly warrants considerable research by the electric utilities, manufacturers and associated industries in order to develop a practical all-electric heating and cooling unit. The coal industry should be particularly interested in the heat pump, since its widespread adoption would increase enormously the coal consumption by the electric industry. In 1946, for each kilowatt hour generated, the average consumption of coal by the electric utility industry was 1.29 lbs. At this rate, 100 million tons of coal would be required to supply the electric energy for the potential residential heat pump market. This potential 100-million-ton figure represents a material increase when compared with the estimated present-day figure of 75 million tons of coal consumed annually by approximately 51 per cent of the electric generating stations in the United States. Using coal at the power plant to generate the electric energy requirements for the heat pump offers one way of offsetting the unfavorable competitive situation that coal is now under when compared with other fuels in the residential heating market. It is true that coal is still the dominant fuel in the residential heating field. How long it will continue to remain so is questionable when it is considered that domestic heating installations, using other than coal, jumped from 22.5 in 1940 to 73 per cent in 1946.

Electric resistance heating is considered by many to be the ideal because of the absence of firing and other furnace labors together with the elimination of fuel and combustion products from the premises. Unfortunately, however, even with these inherent advantages there are relatively few areas in the United States where electric resistance heating is being used or can be justified at the present time when the relative cost of delivered electric energy is compared with the corresponding cost of other fuels.

The heat pump offers a way of eliminating the handicap that electric energy is under when it attempts to enter the residential heating field on a straight energy conversion basis by furnishing 3 to 5 kwh. of equivalent heat for each kilowatt-hour of energy used and at the same time maintaining all of the advantages cited for electric resistance heating plus the additional advantage of providing comfort cooling.

The Heat Pump—What Is It?

Before it is possible to properly evaluate the potentialities of the heat pump it is necessary to know what the heat pump is, how it works and to become familiar with some of the existing design and installation problems. The heat pump is a compression type refrigerating system consisting of a condenser, evaporator, compressor and expansion valve, so designed as to enable the condenser to deliver usable heat during one cycle of operation and the evaporator to deliver cooling during the other cycle. The equipment arrangement of a basic heat pump cycle is perhaps best illustrated by referring to schematic diagram, Fig. 1. During the heating cycle, the compressor or pump delivers the high-temperature, high-pressure refrigerant gas to the condenser "A," where it is liquefied,

Presented at American Mining Congress Coal Convention, Cleveland, Ohio, May 12, 1947.

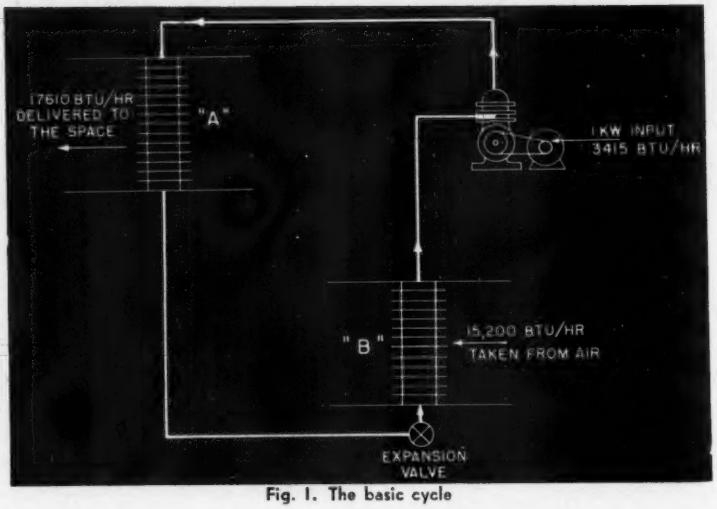


Fig. 1. The basic cycle

giving up its latent heat to the air passing over the surface. From surface "A" the liquid refrigerant goes through the expansion valve to evaporator "B," where it is gasified, absorbing the necessary latent heat from the outdoor air. From surface "B" the low-temperature, low-pressure gas returns to the compressor to repeat the cycle. In other words, during the heating cycle, the heat absorbed from a low-temperature source by the evaporator is raised or pumped to a higher temperature level by the compressor and delivered to the condenser for use in heating the space. If it is assumed, as indicated in Fig. 1, that the refrigerant in the evaporator absorbs 15,200 B.t.u./hr. from the air in changing from a liquid to a gas, then the heat delivered to the space by the condenser, based on present-day equipment, will probably be in the neighborhood of 17,610 B.t.u./hr. requiring one kw. input at the motor terminal. The difference of 2,410 B.t.u./hr. between the 15,200 absorbed by the evaporator and the 17,610 rejected by the condenser represents the amount of heat added to the gas by the compressor. The efficiency commonly called the "coefficient of performance" is the total heat delivered divided by the heat equivalent of the work done in producing the effect, so that in the example the $Cp = \frac{17.610}{3.415}$ or 5.17. That is, 5.17 times more heat is used as equivalent work.

The basic heat pump cycle, illustrated by Fig. 1, is not a recent discovery or development. In fact, thermodynamically this cycle has been known for approximately 95 years and has been extensively used throughout the civilized world in the domestic mechanical refrigerators to maintain a low temperature within a space or cabinet for the preservation of food. In the mechanical refrigerator, however, the primary object is the refrigerating effect produced by the low-temperature surface (called the evaporator), while in the heat pump for comfort heating and cooling the heat rejected from the condenser is of equal importance.

Both Heating and Cooling Possible

Obtaining the heating as well as the cooling requirements with a heat pump, by reversing the air circuit, can be illustrated by again referring to Fig. 1. During the heating cycle, the air from the space to be heated is circulated over the condenser and the outdoor air from which the heat is taken is passed over the cooling surface or evaporator. During the cooling cycle, air from the space to be cooled is circulated over the cooling surface, or evaporator, and the outdoor air is passed over the condenser. Perhaps a more common method of heating and cooling is achieved, particularly in the smaller sizes, by changing the refrigerant flow, as illustrated in Fig. 2. In this arrangement, the air from the space always passes over the same surfaces (called the conditioner coil) and the outdoor air always passes over the so-called outdoor coil. During the heating cycle, by positioning the valves, the refrigerant gas from the compressor is made to go first to the conditioner coil, then through the expansion valve to the outdoor coil. During the cooling cycle the refrigerant gas from the compressor goes first through the outdoor coil, then through the expansion valve to the conditioner coil.

Instead of using air as the heat source, as illustrated in Figs. 1 and 2, water, ground or any other suitable source can be used in the manner illustrated by Fig. 3. The refrigerant cycle is the same as described by Fig. 2. The chief difference in the two arrangements is the type of heat transfer surface employed for the heat source. Although Figs. 1, 2 and 3 indicate air as the medium circulated to the space, water or any other fluid can be employed equally as well by using a suitable heat transfer surface in place of the conditioner coil illustrated.

Use as a Water Heater

In addition to the heat pump air conditioner, another unit which offers equal if not greater possibilities in the residential field is the heat pump water heater for the heating of water for domestic use. Equipment for a heat pump water heater consists of a refrigerating compressor, cooling surface or evaporator, expansion valve, condenser and water storage tank. One of several possible arrangements

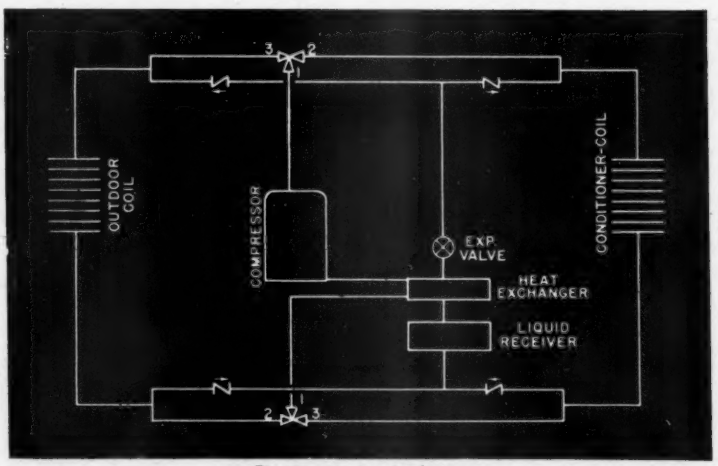


Fig. 2. Air to air design
Heating cycle: 3-way valves—position 1-2
Cooling cycle: 3-way valves—position 1-3

of the heat pump water heater is illustrated by Fig. 4. The compressor transfers the heat absorbed by the evaporator to the condenser. The condenser passes this heat to the water in the tank. The water heater can easily be designed as a self-contained unit and can be manufactured on a quantity production basis.

Figs. 2 and 3 show that air, water and the earth can be used as the heat source during the heating cycle and also used to remove the heat from the condenser during the cooling cycle. The temperature of the heat source (directly related to the compressor saturated suction temperature) and the temperature at which the heat is delivered to the conditioned space (directly related to the compressor condensing temperature) materially affect the coefficient of performance of the system during the heating cycle, as indicated by Fig. 5. From this figure a coefficient of performance of 3.88 is obtained, if the suction temperature is 30 F., and the condensing temperature is 100 F. If the condensing temperature is maintained at 100 F. and the suction temperature is raised to 48 F., the coefficient of performance becomes 5.60. However, if the suction temperature is held at 48 F. and the condensing temperature increases from 100 to 120 F., the coefficient of performance decreases from 5.60 to 4.0. Consequently, to obtain maximum coefficient of performance during the heating cycle, the lowest possible supply air temperature to the space should be used and a heat source having the highest temperature should be employed.

Heat Sources Should Be Constant

From the discussion of Fig. 5, it is evident that the attractiveness of a heat pump system is materially enhanced by the constancy of the heat source available. An ideal heat source is one which maintains a fairly uniform temperature (50-80 F.) the year round and which is also abundant and cheap. Well water meets this requirement, providing it is chemically suited, not requiring special metals or extensive treatment, and providing means can be found for its disposal after use. The chief disadvantage of water is the uncertainty of finding it in any given location and the cost of drilling and maintenance further detracts from its use in many places. From the standpoint of availability and cheapness, air is a most attractive heat source. Unfortunately, many areas of the United States experience not only wide fluctuations in air temperatures but the temperature drops quite low during certain periods of the year, requiring excessive compressor capacity or the use of auxiliary heating to meet the maximum heating requirements. However, in

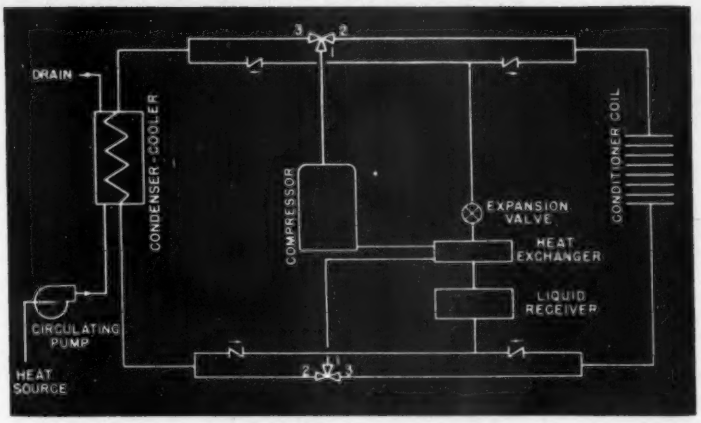


Fig. 3. Water to air design
Heating cycle: 3-way valve—position 1-2
Cooling cycle: 3-way valve—position 1-3

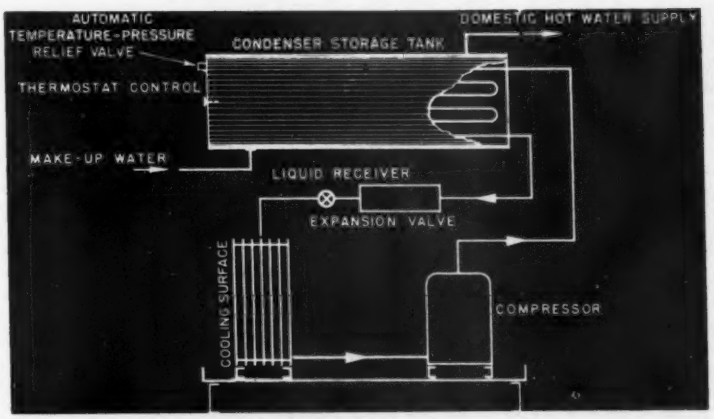


Fig. 4. Domestic hot-water heat pump

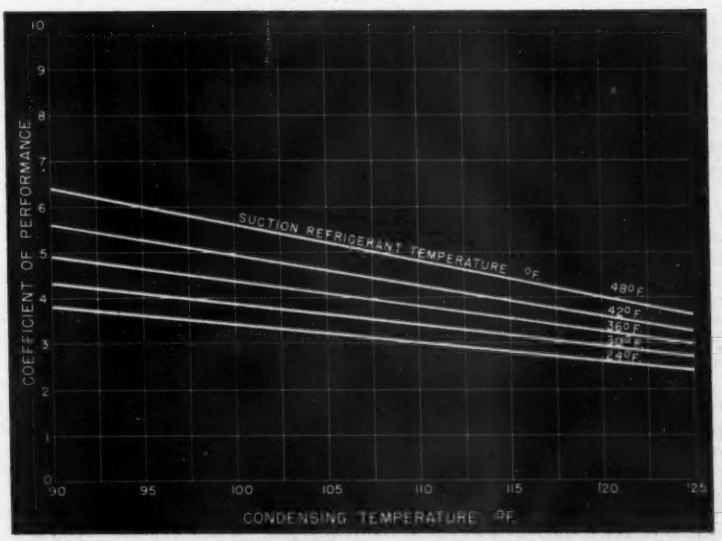


Fig. 5. Relationship between temperature of air supply and performance

areas where the minimum temperatures are not too low or of too long duration, air has been quite successfully used and shows considerable promise for the future, particularly when combined with a storage system.

Earth itself offers possibilities as a heat source but to date very little data is available on the conductivity of heat to and from the ground. Considerably more data are necessary before the source can be evaluated properly. Several universities, manufacturers and electric utilities are investigating the ground as a heat source and have already made, or plan to make in the near future, actual installations in order to determine the heat transfer between the earth and the refrigerant for different types of soil. This trial installation will also enable the utilities to obtain some knowledge of the cost and performance of such an installation. Information published to date indicates that the conductivity of heat directly to and from the soil is quite variable due to the wide range of climatic conditions and geological formation found throughout the country.

Costs Appear Favorable

The discussion of relative merits of heat sources brings us to the important question of comparative operating cost of the heat pump with that of a conventional heating system. This is a rather difficult comparison to make because operating costs depend on a number of variable items, such as the type of fuel used, type of equipment employed and the care with which it is operated. Some idea, however, of what can be expected can be obtained by considering the fuel cost only. Such an analysis, based on heating cost per million B.t.u., is given by Table 1. Here a comparison of the costs of heating by electric resistance methods, heat pump, coal, oil, natural and artificial gas is presented. Representative figures have been assumed for costs per unit, B.t.u. per unit and efficiencies. Costs for other conditions may easily be computed from the table by proportion.

The equipment and installation cost of a heat pump cannot be directly compared with a conventional heating system because the heat pump is a year-round air conditioning plant supplying both heating and cooling, while the conventional system supplies heating only. The heat pump should be compared with the cost of a conventional heating system plus the cost of a conventional cooling system. On this basis, the first cost of the commercial version of the heat pump promises to be below that of conventional heating and cooling equipment now available. With quantity production and with improved design and production technique, there is no inherent reason why the first cost of a heat pump system cannot be brought to a competitive plane with the conventional types of heating systems. Considering the small quantity of heat pump units being manufactured, the first cost is not too far out of line.

TABLE 1
COMPARATIVE COSTS OF HEATING METHODS

Method of Heating	*Cost Per Unit*	*Cost Per Million B.t.u.*
Electric resistance	1½¢ per kwh.	$4.41
Electric resistance	2¢ per kwh.	5.87
Heat pump Cp = 4	1½¢ per kwh.	1.10
Heat pump Cp = 4	2¢ per kwh.	1.47
Heat pump Cp = 5	1½¢ per kwh.	0.88
Heat pump Cp = 5	2¢ per kwh.	1.17
Heat pump Cp = 6	1½¢ per kwh.	.735
Heat pump Cp = 6	2¢ per kwh.	.98
Coal, 12,000 B.t.u./lb.	$10 per ton	.69
Coal, 12,000 B.t.u./lb.	$15 per ton	1.04
Oil, 140,000 B.t.u./lb.	8¢ per gal.	.952
Oil, 140,000 B.t.u./lb.	10¢ per gal.	1.19
Natural gas, 900 B.t.u./cu. ft.	40¢ per 1,000 cu. ft.	0.741
Artificial gas, 550 B.t.u./cu. ft.	70¢ per 1,000 cu. ft.	2.12

Note: Fuel burning efficiencies taken as 0.60.

Equipment Already in Use

To date, two manufacturers have fabricated and installed in the neighborhood of 200 heat pump units and two more manufacturers have publicized their intention of going into production in the near future. The developments by these manufacturers are very encouraging and deserve all the help that can be provided, but many more manufacturers must be gotten into the picture before successful development and marketing of the heat pump is to be achieved on a national level.

Toward this end, a heat pump program is being undertaken as a joint effort by the electric utilities and the air conditioning equipment manufacturers for the research, development and design of a suitable residential heat pump air conditioner unit and a heat pump water heater. The program is divided into two phases. The first part of the program is to develop and manufacture a compact, neat appearing heat pump air conditioner and water heater in accordance with specifications which have been prepared by the electric utilities. These self-contained units are to be designed especially for the job they are to do, to give high reliability, reasonable first cost and operating performance exceeding that obtained by present day equipment. The second part of the program is to explore the various heat sources in order to determine which of the available sources are applicable and most practical to the different sections of the United States.

All of the foregoing factors must be considered whenever any thought is given to the potentialities of the electric heat pump in the residential heating and cooling field. A number of the design and operation difficulties, which have been responsible for the slow progress of the heat pump in the past, have already been solved or are now in the process of being solved, while others still need further investigation and study. On the whole, however, the development of the heat pump with proper encouragement and cooperation from the utilities, manufacturers and associate industries should result in an acceptable all-electric heat pump air conditioner and heat pump water heater in the not too distant future.

India Debasing Silver Coinage

The government of India has moved towards total elimination of silver from the country's coinage. A bill has been introduced in the Central Assembly to permit issuance of rupee coins in nickel. Silver has already been removed from smaller coins.

Finance Minister Liquat Ali said recently that the "elimination of silver from rupee coin also will facilitate the return of lend-lease silver to America and might enable the government to control the speculative rise of silver prices in Indian should occasion occur."

The United States lent India about 260 million ounces of silver in 1944 on condition that it be returned weight for weight in silver within five years. Another bill in preparation will divide the rupee into 100 cents to introduce the decimal system in place of the present 16 annas per rupee in India.

Full Seam Mining With Mechanical Loading

Submitted by R. L. Anderson to the Committee on Surface Preparation

THE Coal Division Committee on Surface Preparation is endeavoring to obtain and publish data on the relation of full-seam mining to surface preparation, and this paper is a preliminary survey on the subject.

Full-seam mining is defined as, "To mine and load out an entire coal seam with little or no attempt to separate at the face and partings in the seam or remove slate that may come down with the coal." In mechanical loading operations there has been a gradual departure from the hand-loading practice of picking out all possible impurities at the face. As mechanical cleaning methods have improved, the burden on the cleaning plant has gradually been increased, until today there are some mines which load as much as 12 in. of draw slate with the coal and make the separation at the surface plant. The total capacity of bituminous coal cleaning equipment sold in 1946 was 18,000 tons of cleaned coal per hour, but additional mechanical cleaning capacity must be provided before full-seam mining can be practiced.

Summary of Survey Data

General summary data shown in the following tables and figures were obtained from annual reports submitted by the coal producers to the Bureau of Mines. Detail data shown in Table 3 and Figs. 3 and 4 were submitted by members of the Coal Division Committee on Surface Preparation.

Figure 1 shows the percentage of bituminous coal produced in the United States by methods of mining and underground loading at mines *with* and *without* mechanical cleaning facilities for the 6-year period 1939 to 1945, inclusive.

The portion of the bars above the dotted line includes production of mines *with* mechanical cleaning facilities. Strip mines in this group increased from 4.6 per cent of the total production in 1939 to 6.2 per cent in 1945, while mines employing mechanical loading increased from 13.5 per cent to 22.5 during the same period. The apparent decrease, from 15.7 per cent to 8.4, of total production at mines employing 100 per cent hand loading was not the result of decreased mechanical cleaning but of the change from hand to mechanical loading. The total production by all types of mining at mines *with* mechanical cleaning facilities increased from 33.8 per cent in 1939 to 37.1 per cent of the total output in 1945.

The portion of the bars below the dotted line includes the production of mines *without* mechanical cleaning facilities. Production from strip mines shows a greater increase in this group due to increased strip production and lack of additional mechanical cleaning plants during the war. The percentage of total production at mines employing mechanical loading increased 3.1 per cent in the 6-year period at mines *without* mechanical cleaning facilities, compared with a 9.0 per cent increase at mines *with* mechanical cleaning facilities. Table 1 shows tonnage figures from which the data in Figure 1 were computed.

In volume of total coal mechanically cleaned, Pennsylvania led in 1945, followed by West Virginia, Illinois, Alabama, Indiana, Kentucky, and Ohio, in the order named. In terms of coal cleaned at the mines, Pennsylvania ranks third and the other states in the same order as shown above. These seven states produced 91 percent of the total mechanically cleaned bituminous coal in the United States in 1945. During the period 1939-45, the total number of plants increased from 365 to 439 and the percentage of total output mechanically cleaned increased from 20.1 to 25.6.

Mines served by mechanical cleaning plants, exclusive of those that ship to washeries operated by steel companies, produced 214 million tons, or 37 per cent of the total bituminous output in 1945. In this same group of mines, 139 million tons were mechanically cleaned; therefore, 65 per cent of the coal produced at mines with cleaning plants in 1945 was cleaned at the mine. The balance of the output from these mines (35 per cent) presumably

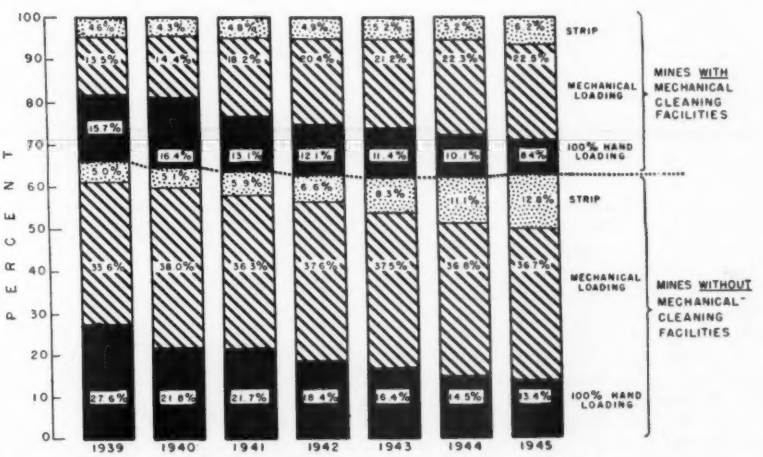


Figure 1. Percentage of bituminous coal produced by various methods of loading at mines with and without mechanical cleaning

This report by Mr. Anderson, engineer-economist, U. S. Bureau of Mines, is published by permission of the Director, Bureau of Mines, U. S. Department of the Interior.

TABLE 1.—PRODUCTION OF BITUMINOUS COAL AT MINES *WITH* AND *WITHOUT* MECHANICAL CLEANING FACILITIES, BY METHODS OF MINING, IN THE UNITED STATES, 1939-45

Year	Mining method in use	Thousand of net tons			Percentage		
		With mechanical cleaning facilities	Without mechanical cleaning facilities	Total	With mechanical cleaning facilities	Without mechanical cleaning facilities	Total
1939	Strip mined	17,960	19,762	37,722	4.6	5.0	9.6
	Underground: mechanical loading	53,496	132,951	186,447	13.5	33.6	47.1
	100% hand loading	61,858	108,828	170,686	15.7	27.6	43.3
	Total	133,314	261,541	394,855	33.8	66.2	100.0
1940	Strip mined	20,030	23,137	43,167	4.3	5.1	9.4
	Underground: mechanical loading	66,148	175,233	241,381	14.4	38.0	52.4
	100% hand loading	75,558	100,665	176,223	16.4	21.8	38.2
	Total	161,736	299,035	460,771	35.1	64.9	100.0
1941	Strip mined	24,773	30,298	55,071	4.8	5.9	10.7
	Underground: mechanical loading	93,374	186,741	280,115	18.2	36.3	54.5
	100% hand loading	67,321	111,642	178,963	13.1	21.7	34.8
	Total	185,468	328,681	514,149	36.1	63.9	100.0
1942	Strip mined	28,597	38,606	67,203	4.9	6.6	11.5
	Underground: mechanical loading	118,917	218,995	337,912	20.4	37.6	58.0
	100% hand loading	70,560	107,018	177,578	12.1	18.4	30.5
	Total	218,074	364,619	582,693	37.4	62.6	100.0
1943	Strip mined	30,326	49,359	79,685	5.2	8.3	13.5
	Underground: mechanical loading	125,314	221,479	346,793	21.2	37.5	58.7
	100% hand loading	67,258	96,441	163,699	11.4	16.4	27.8
	Total	222,898	367,279	590,177	37.8	62.2	100.0
1944	Strip mined	32,444	68,454	100,898	5.2	11.1	16.3
	Underground: mechanical loading	137,927	227,969	365,896	22.3	36.8	59.1
	100% hand loading	62,565	90,217	152,782	10.1	14.5	24.6
	Total	232,936	386,640	619,576	37.6	62.4	100.0
1945	Strip mined	35,910	74,077	109,987	6.2	12.8	19.0
	Underground: mechanical loading	129,733	212,027	341,760	22.5	36.7	59.2
	100% hand loading	48,615	77,255	125,870	8.4	13.4	21.8
	Total	214,258	363,359	577,617	37.1	62.9	100.0

represents the larger sizes commonly hand-picked in the tipple.

Figure 2 shows the ratio (percentage) of refuse to raw coal at bituminous-coal-cleaning plants at the mines in seven selected states and total United States, 1939-45. The ratio of refuse to raw coal varies in these seven states from a low of 6.5 per cent in Pennsylvania for 1939 to a high of 23.7 per cent in Ohio for 1945. Data on central washeries operated by consumer steel companies in Colorado and Pennsylvania are not included in these figures. During 1945 these central washeries handled nine million tons of clean coal and the ratio of refuse to raw coal was 7.4 per cent.

Three states—Ohio, Alabama, and Kentucky—showed rapid increases in the percentage of refuse to raw coal (an average of 10 per cent) from 1939 to 1945. The other four states—Illinois, Indiana, West Virginia, and Pennsylvania—averaged an increase of less than 2 per cent during the same period. In the six-year interval, the

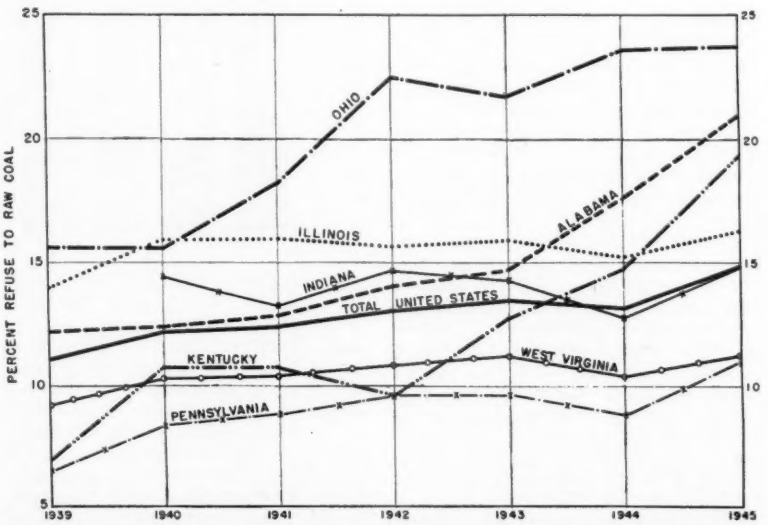


Figure 2. Ratio of refuse to raw coal at bituminous coal cleaning plants in certain states and in the United States

percentage increase in output of clean coal was approximately the same for both groups of states—90 for the three states and 95 for the four states; however, the tonnage mechanically loaded increased 275 per cent in the three states and only 125 per cent in the four-state group; strip mining increased 340 and 195 per cent in the three-state and four-state groups, respectively. From these percentages it appears that rapid increases in the ratio of refuse to raw coal go hand in hand with rapid increases in tonnage mechanically loaded and strip-mined.

Table 4 shows the ratio (percentage) of refuse to raw coal at bituminous-coal mines *with* mechanical cleaning facilities by types of mining and underground loading in the seven largest coal-producing states in 1945. These percentages include the results of mechanical cleaning operations only and not hand picking in tipple. Generally the percentage of refuse is greater at strip mines than at underground mines; however, West Virginia, Alabama, and Ohio are exceptions. In terms of weighted average of these seven states, strip mines have the largest proportion of refuse to raw coal (17.9 per cent), followed by underground mines using both loading machines and conveyors (17.2 per cent), underground mines using loading machines only (14.2 per cent), and underground mines with 100 per cent hand loading (10.3 per cent).

Underground mines using loading machines only produced approximately 54 per cent of the total tonnage of mechanically cleaned coal in 1945, followed by strip mines (20 per cent), underground mines using both loading machines and conveyors (14 per cent), underground mines using conveyors only (7 per cent), and underground mines with 100 per cent hand loading (5 per cent).

TABLE 2.—RATIO OF REFUSE TO RAW COAL AT BITUMINOUS-COAL MINES WITH MECHANICAL CLEANING FACILITIES BY TYPES OF MINING AND UNDERGROUND LOADING IN SELECTED STATES, 1945

State	Strip mines	UNDERGROUND MINES					Total all mines
		Using loading machines only[1]	Using conveyors only[2]	Using both loading machines and conveyors	With 100% hand loading	Total	
West Virginia	7.4%	9.6%	10.1%	15.8%	9.7%	11.2%	11.2%
Illinois	20.1	12.8	...	15.6	13.5	13.2	16.2
Pennsylvania	12.2	12.2	4.9	8.5	5.7	10.9	11.0
Alabama	14.4	20.5	17.9	26.6	14.6	21.6	20.9
Indiana	16.1	13.5	...	...	...	13.5	14.9
Kentucky	19.5	19.8	6.5	16.4	9.1	19.3	19.4
Ohio	10.0	25.3	...	...	...	25.3	23.7
Average of above	17.9	14.2	12.3	17.2	10.3	14.4	15.1

[1] Includes mobile loaders, scrapers and conveyors equipped with duckbills or other self-loading heads.
[2] Includes hand-loaded conveyors and pit-car loaders.

Full Seam Mining Operations

Figure 3 shows the percentage of refuse and of clean coal hand-picked in tipple and mechanically cleaned *before* and *after* full-seam mining was practiced at four selected mines. Table 5 shows the average monthly tonnage figures from which these percentages were compiled.

For convenience, these mines are arranged in order of percentage of raw coal hand-picked in tipple before full-seam mining was practiced. Mine "A" handled the greatest, or 38.7 per cent, and Mine "D" the smallest, or 15.0 per cent.

Before each mine is described, it may be well to state certain facts common to all. Full-seam mining was put into practice to reduce costs or increase production. It is assumed that the coal produced was of approximately the same quality *before* and *after* full-seam mining was introduced. No data are available on the number of men employed; however, estimates could be made on the number required for hand-picking in tipple from the tonnage figures shown in Table 5. Hand-picking of plus 4-in. coal at 11 mines varied from 0.6 to 3.5 tons of reject removed per man per hour.* With an average amount of free impurities and under favorable working conditions, one picker should remove about two tons of reject per hour from plus 4-in. coal.

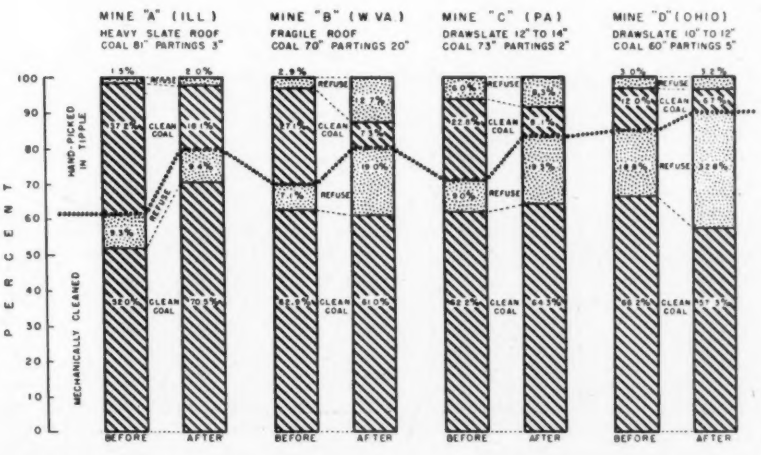


Figure 3. Percentage of refuse and clean coal, hand-picked and mechanically cleaned, before and after full seam mining at four selected mines

Illinois

Mine "A" is in Illinois and started full-seam mining in 1938. The No. 6 seam is being mined, and it has a heavy slate roof and a soft fire-clay bottom. The average thickness of the seam is 84 in., which includes 3 in. of partings, consisting of blue-band and pyrite streaks.

Before full-seam mining was practiced, the total output was hand-loaded onto pit-car loaders, and all possible impurities were picked out at the face. When full-seam mining was introduced, track-mounted mobile loaders replaced the pit-car loaders, and only large pieces of draw slate were removed before loading.

The figures shown on the bars represent the percentage of total raw coal entering the tipple and cleaning plant. Figures on each bar total 100 per cent. Sizes hand-picked in tipple include 7-in. lump and 4-in. x 7-in. egg.

Raw coal, hand-picked in tipple was reduced from 20,632 tons per month to 11,855 and refuse increased from 823 tons to 1,200, *after* full-seam mining was introduced. The percentage of refuse from the cleaning plant showed little change, increasing from 9.3 "before" to 9.4 "after." The net result *after* full-seam mining was installed amounted to an average monthly increase of 4,618 tons of clean coal and 934 tons of refuse.

* Davis, D. H., Coal Preparation, A.I.M.E., (1943). p. 246.

TABLE 3.—AVERAGE MONTHLY DATA ON HAND-PICKING AND MECHANICAL CLEANING AT FOUR SELECTED BITUMINOUS-COAL MINES *BEFORE* AND *AFTER* PRACTICING FULL-SEAM MINING

Mine	Thickness		Before or after full seam mining	Hand-picked in tipple				Mechanically cleaned			
	Coal	Partings		Raw coal (tons)	Clean coal (tons)	Refuse (tons)	Per cent refuse to raw	Raw coal (tons)	Clean coal (tons)	Refuse (tons)	Per cent refuse to raw
A (Ill.)	81″	3″	Before	20,632	19,809	823	4.0	32,665	27,719	4,946	15.1
			After	11,855	10,655	1,200	10.1	46,994	41,491	5,503	11.7
B (West Va.)	70″	20″	Before	14,960	13,499	1,461	9.8	34,905	31,380	3,525	10.1
			After	9,957	3,629	6,328	63.6	39,908	30,416	9,492	23.8
C (Pa.)	73″	2″	Before	18,210	14,410	3,800	20.9	45,030	39,340	5,690	12.6
			After	12,180	6,020	6,160	50.6	62,100	47,730	14,370	23.1
D (Ohio)	60″	5″	Before	23,200	18,558	4,642	20.0	131,209	102,159	29,050	22.1
			After	19,820	13,500	6,320	32.0	180,615	114,939	65,676	36.4
Total and average	...	...	Before	77,002	66,276	10,726	13.9	243,809	200,598	43,211	17.7
			After	53,812	33,804	20,008	37.2	329,617	234,576	95,041	28.8

West Virginia

Mine "B" is in West Virginia and started full-seam mining in 1936. The Cedar Grove seam is being mined, and it has a bad fragile top and soft bottom. The average thickness of the seam is 90 in., including 20 in. of partings.

Before full-seam mining was practiced, all coal was loaded by hand and impurities were picked out at the face. After mobile loaders were installed, the entire seam was loaded directly into mine cars. Refuse, hand-picked in tipple, increased from 2.9 per cent, or 1,461 tons per month, to 12.7 per cent of total raw coal, or 6,328 tons per month, when the full seam was loaded out. At the same time the refuse from the mechanical cleaning plant increased from 7.1 per cent, or 3,525 tons per month, to 19.0 per cent, or 9,492 tons per month. The net result after the full seam was loaded amounted to an average decrease of 10,834 tons of clean coal per month and an increase of the same tonnage (10,834) of refuse.

Pennsylvania

Mine "C" is in Pennsylvania and started full-seam mining in 1946. The Pittsburgh seam is being mined; it has a sandy shale roof with 12 to 14 in. of draw slate and a fire-clay bottom. The average thickness of the seam is 75 in., including 2 in. of partings.

This mine was using mechanical loading machines before full-seam mining was put into practice. Although the questionnaire submitted on this mine did not state what preparations were made at the face before full-seam mining was practiced, it is assumed that a considerable amount of draw slate was removed or propped in place before and during the loading of coal. Plus 4-in. coal was hand-picked in tipple "before" and plus 7-in. was hand-picked "after" full-seam mining was introduced.

Size minus 7-in. x 4-in. material was crushed to minus 4-in. and sent to the cleaner without picking. The net result after full-seam mining was practiced at Mine "C" amounted to an average increase of 11,040 tons of refuse per month and no change in the quantity of clean coal produced.

Ohio

Mine "D" is in Ohio and started full-seam mining in 1940. The Pittsburgh No. 8 seam is being mined; it has 10 to 12 in. of draw slate and 12 in. of roof coal. The average thickness of the seam is 65 in., including 5 in. of partings.

This mine was using loading machines "before" and "after" full-seam mining was put into practice. Raw coal hand-picked in tipple included plus 5-in. "before" and plus 7-in. "after" the full seam was loaded. The mechanical cleaning plant handled all sizes that were not hand-picked. The net result after full-seam mining was practiced amounted to an average increase of 38,304 tons of refuse and 7,722 tons of clean coal per month.

Figure 4 shows percentages based on the weighted average tonnage of coal and refuse handled at these four mines. The average refuse hand-picked in tipple increased from 3.3 per cent to 5.2 while the clean coal decreased from 20.7 per cent to 8.8. The average proportion of refuse to raw coal increased from 13.9 per cent to 37.2 on tonnage hand-picked in tipple and increased from 17.7 per cent to 28.8 on tonnage mechanically cleaned.

The total figures at the bottom of the columns show that clean coal decreased from 83.2 per cent to 70 per cent of the total raw coal handled. The total net change at these four mines was a monthly increase of 1,506 tons of clean coal and 61,112 tons of refuse.

Table 5 shows tonnage figures from which data in Figures 3 and 4 were computed.

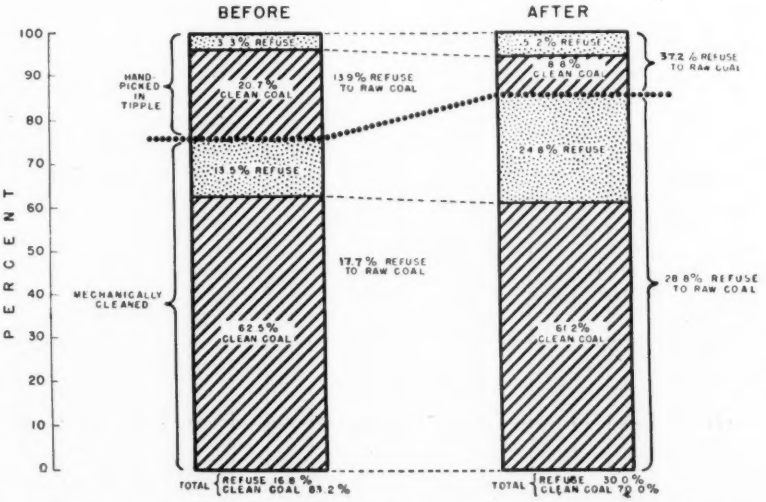


Figure 4. Average percentage of refuse and clean coal, hand-picked and mechanically cleaned, before and after full seam mining was practiced at four selected mines

WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

THE probable adjournment date of Congress has now been moved forward to mid-July. The House calendar is cleared of major measures with the exception of a few appropriation bills and conferees' reports still to come on tax reduction and general labor bills. Senate approval of the labor bill is drawing near and the individual income tax reduction measure will be the next issue debated on the floor.

House Ways and Means Committee Chairman Knutson has announced hearings in the near future on general tax revision, with particular reference to administrative features of the Revenue Code. These hearings are expected to suspend when the present session of Congress adjourns, and the chairman has stated that his committee may resume work in the fall to prepare a bill for early submission to the House in the second session of the 80th Congress in 1948.

There are varied surmises as to what action the President will take when the portal-to-portal bill, the general labor measure, and the individual income tax reduction bill arrive at the White House. Every vote thus far, particularly in the House, indicates a determination to override any veto, although there is concern among the proponents of these measures over the final outcome of this majority party program.

Portal Bill to White House

On May 1, both House and Senate aproved the conferees' report on the Portal-to-Portal Act of 1947 and sent the bill to the President. The conferees had reported April 29 after nine weeks consideration of the measure.

As sent to the White House this combination of the Gwynne bill and the Senate version (both discussed in previous issues) gives a constructive answer to the serious back pay problems posed by the Wage-Hour Act, administrative rulings under the Act and various court decisions. Accrued or existing portal-type claims are barred under provisions relieving employers from liability for failure to pay for activities not compensable by express contract provision, or by a custom or practice in effect when the activity was performed. On future claims, no employer shall be subject to liability or punishment for failing to pay an employe for "walking, riding, or travel" time or for "preliminary" or "postliminary" activities except by contract, custom or agreement.

Outstanding in its provisions is Section 9 which deals with reliance on past administrative rulings. This provides that as to pending claims no employer shall be subject to any liability or punishment on account of failure to pay minimum wages or overtime compensation in any suit or proceeding under the Wage-Hour, Walsh-Healey, or Bacon-Davis Act, if he pleads and proves that the act or omission was in good faith and in reliance on any administrative regulation, order, ruling, approval, or interpretation, or any administrative practice or enforcement policy of any United States agency. Such a defense would constitute a bar to suit notwithstanding that after his act or omission a regulation, etc., is modified or rescinded, or is determined by judicial authority to be invalid or of no legal effect.

Section 10, dealing with an employer's reliance in the future on administrative rulings, is essentially the same but refers to reliance in good faith on any *written* administrative regulation, order, ruling, etc., of the particular agency charged with administration of the statute.

The statute of limitations contained in the bill provides that actions which accrued after enactment, must be "commenced within two years after the cause of action accrued" or be forever barred. Causes of action which have accrued in the past may be commenced within the shorter of the following periods: "(1) Two years after the cause of action accrued, or (2) the period prescribed by the applicable state statute of limitations"; however, a "grace period" af 120 days from date of enactment is allowed unless the action is barred by state statute.

The bill also would permit compromise of existing or past portal claims and remove jurisdiction from the courts to hear claims which are not compensable either by contract, custom, or usage.

House Passes Labor Bill

House passage of the Hartley (Rep., N. J.) general labor bill by a vote of 308 to 107 on April 17, gave notice that the lower Chamber will override any possible White House veto. The bill abolishes the existing discredited NLRBoard, and creates in lieu thereof a new board of fair-minded members to exercise quasi-judicial functions only; establishes a new official to exercise the various prosecuting and investigating function under the NLRAct, to be entirely independent of the Board; requires the Board to act only upon the weight of credible legal evidence, and gives to the courts of the United States a real, rather than a fictitious power to review decisions of the

Washington Highlights

CONGRESS: Hopes to adjourn by July 15.

PORTAL-TO-PORTAL: Sent to White House.

LABOR BILL: To conferees soon.

COPPER: Import excise tax suspended.

POLLUTION: A.M.C. witnesses oppose bill.

COAL: Wage negotiations on.

CENTRALIA: Mine inspection legislation proposed.

PREMIUM PRICES: Russell bill reported to House.

WAGE-HOUR: Belo case reaffirmed.

Board; outlaws the closed shop and monopolistic industry-wide bargaining; exempts supervisors from the compulsory features of the NLRAct; imposes on both parties to labor disputes the duty of bargaining and requires that the employes themselves be given a voice in bargaining arrangements through the device of providing for a secret ballot of the employes on their employer's last offer of settlement to the dispute; protects the existence of labor organizations which are not affiliated with one of the national Federations; prohibits certification by the Board of labor organizations having Communist or subversive officers; prescribes the rights which an individual member of a labor organization can justly claim of his union, and gives him protection in the exercise of those rights; outlaws sympathy strikes, jurisdictional strikes, illegal boycotts, collusive strikes by employes of competing employers, as well as sit-down strikes and other concerted work interferences conducted by remaining on the employer's premises; outlaws strikes to remedy practices for which an administrative remedy is available under the bill or to compel an employer to violate the law; outlaws mass picketing and other forms of violence designed to prevent individuals from entering or leaving a place of employment; outlaws picketing of a place of business where the proprietor is not involved in a labor dispute with his employes; gives the person injured by unlawful concerted activities a right to sue civilly any person responsible therefor; prescribes unfair labor practices on the part of employes and their representatives as well as by employers; creates a new and independent conciliation agency; removes the exemption of labor organizations from anti-trust laws when such organizations, acting either alone or in collusion with employers, engage in unlawful restraints of trade; makes labor organizations equally responsible with employers for contract violations and provides for suits by either against the other in the U. S. District Courts; provides a means for solving strikes which imperil or threaten to imperil the public health, safety, or interest; and guarantees to employes, to employers, and to their respective representatives, the full exercise of the right of free speech.

Three amendments added on the House floor provide a blanket prohibition on strikes by Government employes; allow an employer to discharge an employe who "is or ever was a member of the Communist Party"; and make it an unfair labor practice for employers to engage in any concerted activities for collective bargaining purposes except in small plants with less than 100 employes located less than 50 miles apart.

The Senate is still debating the watered-down version of its general labor bill reported to the floor April 17. This bill enlarges the NLRBoard to seven members; excludes supervisors from the definition of employes; by barring discrimination by employers to encourage or discourage membership in a labor organization, it prohibits the closed shop, but it specifically sanctions the union shop; and establishes unfair labor practices for labor unions, including coercion, refusal to bargain collectively, secondary boycotts, jurisdictional strikes, and violation of collective-bargaining agreements. The Board may not base any findings of an unfair labor practice upon statements or arguments which contain no threat of reprisal or force, or offer of benefit. Collective bargaining is defined as a mutual obligation to meet at reasonable times and confer in good faith, but it is stated that such obligation does not compel either party to agree to a proposal or require the making of a concession. Employers are given the right to petition for and obtain elections. Findings of the Board with respect to questions of fact, if supported by substantial evidence on the record considered as a whole, shall be conclusive. The bill creates an independent Federal Mediation Service, and gives the Attorney General power to enjoin strikes or lockouts which threaten to impair the national health or safety. It permits suits for violation of collective bargaining contracts to be brought by either party and makes labor organizations suable in Federal courts.

Five amendments remain to be disposed of before the final vote on passage of the Senate bill. These are (1) curbing industry-wide bargaining through requiring the NLRBoard to certify only unions made up of employes of one employer, or of several employers in a metropolitan district; (2) outlawing "welfare funds" where unions control distribution; (3) making mass picketing and violence unfair labor practices; (4) controlling secondary boycotts, sympathy and jurisdictional strikes by injunction procedure and suits for damages; and (5) outlawing all forms of compulsory union membership.

Copper Import Tax

The President has signed the Patterson (Rep., Conn.) bill suspending the import excise tax of 4c per pound on copper until March 31, 1949—two years. During consideration on the House floor the three-year suspension reported by the Committee on Ways and Means was reduced to two years.

Resistance to the two-year suspension offered by Senators from mining states is reported to have ceased upon receipt of a letter from Ways and Means Committee Chairman Knutson by Senate Finance Committee Chairman Millikin, as a result of which assurances have been exchanged that both will sponsor repeal of the present statute if the domestic copper mining industry should become endangered.

Hearings have continued before the House Committee on Ways and Means, affording a sounding board for domestic manufacturers and producers to warn against harmful reductions in duty protection under the foreign trade agreements policy. Meanwhile the conferences between representatives of fourteen nations, in the course of which foreign trade agreements will be negotiated, began at Geneva, Switzerland, on April 18.

Stream Pollution Hearings

On April 22 Senator Malone's (Rep., Nev.) subcommittee opened hearings on the Barkley-Taft Water Pollution bill, S. 418, discussed in last month's issue. Senator Taft (Rep., Ohio) expressed his interest in the water pollution problem of the Ohio Valley and Surgeon-General Parran of the U. S. Public Health Service endorsed the bill as a means of attacking pollution, particularly in the areas of heavy population concentration.

A representative of the Interstate Commission on the Potomac River Basin testified that Federal participation is not needed, in that the States themselves have direct police powers and therefore can and will require such abatement as is needed. The witness emphasized that a Federal agency in the exercise of such a power is entering a field which the Constitution did not contemplate. Another witness testifying for the Federation of Sewage Works Association stated that the functions of the Public Health Service should be primarily those of investigations and reports. He also declared there is no need for Federal assistance by way of grants-in-aid, that generally speaking there are means for municipalities to finance their own plants, and that the individual States rather than the Federal Government should extend aid where needed.

The paper and pulp industry registered definite objection to the bill and the tanning industry is also expected to appear in opposition.

On May 1 the American Mining Congress witnesses appearing in opposition were spearheaded by Donald A. Callahan of Wallace, Idaho, a vice president of the organization. He presented resolutions which stressed the fact that water pollution is a local problem, by the Idaho Mining Association, the Northwest Mining Association, and the American Mining Congress. The Mining Congress resolution of December 2, 1946 states:

(*Continued on page* 61)

Personals

M. I. Signer, head of the department of mining, has been named dean of the faculty of the Colorado School of Mines effective April 1, Dr. Ben H. Parker, president of the school, announced recently. He succeeds **James Boyd,** nominated by President Truman for the position of director of the United States Bureau of Mines. Dean Signer is well known in mining and other mineral engineering circles. He has been head of the department of mining engineering at the School of Mines since 1943, and since 1929 has been a member of the faculty of that department.

He received the bachelor of science degree in mining from the Missouri School of Mines in 1922 and the engineer of mines degree from the same school in 1934.

Robert J. Blair has been appointed assistant general superintendent of mines for The Black Diamond Coal Mining Company, Birmingham, Ala.

Joseph P. Smith, chief geologist of the United States Potash Company, Carlsbad, N. Mex., has returned from a trip to Germany where he spent about six weeks making a study and survey of the potash mining industry.

H. J. Connolly, president of Pennsylvania Coal Company, is representing the anthracite industry on the Coal Mine Committee of the International Labor Organization at its second session to be held at Geneva, Switzerland, starting April 24. Mr. Connolly also represented the anthracite industry at the first session of the International Labor Organization, which was held in London, England, during December, 1945.

Harold D. Maryott recently left the Miami Copper Company, where he was chief mining engineer. He is now general superintendent of the Comstock Extension Mining Co., Globe, Ariz.

Ralph A. Lambert was recently elected vice president of the Pennsylvania Coal Co. Since 1943 he has been general manager and he will continue in this capacity.

George R. Powe, formerly assistant geologist with the Northern Pacific Railway Co., at Billings, is now associated with the Northwest Improvement Co., a subsidiary of Northern Pacific, at Roslyn, Wash.

Herman D. Sydenstricker has been appointed inspector-at-large for the state of West Virginia. Mr. Sydenstricker is a graduate of West Virginia University and was employed by the Carbon Fuel Company of Kanawha County at the time of his appointment. He has had extensive coal mining experience as foreman and superintendent for the Carbon Fuel Company. For the present he will work out of the department's offices in the capitol at Charleston.

C. Donald Dallas, president of Revere Copper and Brass Incorporated, was appointed chairman of the board of directors and **James J. Russell** has been elected president of Revere at a recent meeting of the board.

Mr. Dallas, who was instrumental in effecting the 1928 merger of the six independent large brass and copper companies that resulted in Revere Copper and Brass Incorporated, will continue as chief executive officer.

At the annual meeting of the stockholders of The Eagle-Picher Company, at Cincinnati, Ohio, the Board of Directors was reelected for the coming year. Included on the directorate are: **Joseph Hummel, Jr., Joel M. Bowlby, Arthur E. Bendelari, Vincent H. Beckman, Carl F. Hertenstein, Robert E. Mullane, John J. Rowe, Carl A. Geist, Miles M. Zoller, T. Spencer Shore** and **Elmer Isern.**

The resignation of **Walter P. Neekamp** as assistant deputy administrator, was announced in April by Deputy Solid Fuels Administrator Dan H. Wheeler. He will return to private industry. Mr. Neekamp had general direction of the distribution of bituminous coal and will be succeeded in this assignment by **William C. Dobbie** as acting chief, Bituminous Distribution Division.

Harold K. Hochschild, president of the American Metal Company, has been elected chairman of the board succeeding the late Dr. Otto Sussman. **Charles E. Stott,** general manager of Mexican operations, has been made a director.

George Douglas Copeland has joined the staff of the Exton Chemical and Mineral plants of Foote Mineral Company, Philadelphia. Until recently, Mr. Copeland was an engineering officer with the U. S. Navy, and formerly was associated with the Standard Pressed Steel Co., at Jenkintown, Pa.

John D. Sullivan, assistant to the director, Battelle Institute, Columbus, Ohio, was installed as national president of the American Ceramic Society at the Society's Forty-Ninth Annual Meeting in Atlantic City, N. J., in April. Since 1931 he has had executive responsibility for the research

in ceramic technology conducted by Battelle Institute. He is the author of nearly a hundred technical publications on ceramics and metallurgy and a patentee on numerous patents on developments in these fields. Mr. Sullivan is also active in mineral and metallurgical science and, during the war, was a member of the War Metallurgy Committee of the National Research Council and National Academy of Sciences.

Blair L. Sackett has been appointed general manager for the International Smelting and Refining Company at Salt Lake City, Utah. He succeeds the late A. B. Young. Formerly general superintendent at the Tooele plant, he will be replaced by **Carlos Bardwell,** while **W. J. McKenna** becomes assistant general superintendent.

Edgar F. Schaefer, executive vice president of Gardner-Denver Company, was elected company president and **H. G. Myers,** former president, became chairman of the executive

board at the annual stockholders meeting held in March at Quincy, Ill. Mr. Schaefer came to the Gardner-Denver Company in July of 1919. He was elected vice president in 1926, and became executive vice president in 1942.

Joseph Skiba, who has been superintendent of Pond Creek Pocahontas Company's Mine No. 3 since July 8, 1941, was recently promoted to the position of assistant to the general manager, **C. E. Walker.**

W. T. Warren, formerly general superintendent at the National Tunnel and Mines Company in Tooele, Utah, has resigned after 12 years' service with the Anaconda Copper Mining

Company. Mr. Warren will be general field manager for the International Explosives Corporation in Reno, Nev., where he will continue his work with the shaped charge which has already attracted wide attention among mine opeartors and engineers.

Robert Girke has resigned as field representative of the Anthracite Institute in the eastern New York and Vermont area, according to announcement from the Institute. On April 15, Mr. Girke joined the Schenectady County Coal Co., Schenectady, N. Y., as sales manager.

D. Carl Vickers has been transferred from the engineering department of the Carbon Fuel Company to take charge of a new branch, the production engineering department. He will have charge of preparation and his work will include time studies and recommendations as to the improvement of production methods.

Roy A. Anderson is now assistant professor of geology at the School of Mines at Moscow, Idaho. He recently returned from Bolivia where he had been geologist for Compagnie Aramayo de Mines en Bolivie for nine years.

At a meeting of the board of directors of the Southern Coal Company, Inc., held in Memphis, Tenn., April 1, **R. J. Billings,** who since 1936 had served as president of the Southern Coal Company, Inc., was elected chairman of the board. At the same meeting, **P. B. C. Smith,** who had served as a vice president of the company since 1944, was elected president.

— *Obituaries* —

Alfred W. Dodd, former vice president of the American Zinc, Lead and Smelting Co., died during April at New York City after a long illness, at the age of 82 years. Mr. Dodd retired on October 1, 1946, after having been with the company for more than 30 years in the capacity of eastern manager of sales, vice president, and director. Prior to joining the American Zinc, Lead and Smelting Co., he had been associated with the New Jersey Zinc Company for 19 years. At the time of his retirement last year Mr. Dodd had had a longer active association with the American zinc industry than any other member of the trade.

Oscar M. Hinton, vice president of the Berwind-White Coal Mining Company of 1 Broadway, New York, and a director of many other companies, was killed April 5 on a railroad grade crossing at Keyport, not far from his home. Mr. Hinton was born in Scottsville, Ky., on October 29, 1883. He practiced law there for a time before entering the business world.

Carl F. Whitham, 64, Alaska mining operator and veteran of the gold rush nearly 50 years ago, died recently in Seattle after a short illness. Mr. Whitham went north with his father in 1899. After a year as a trapper, he joined the search for gold. Later he organized the Nebesna Mining Company and was president and manager at the time of his death. The company was engaged primarily in placer mining and is located 200 miles inland from Valdez. Mr. Whitham made his home at Nebesna.

Sudden death, resulting from heart attack claimed **E. L. Berry** on April 3, at the age of 52. Mr. Berry was Link-Belt vice president in charge of production, with headquarters in Chicago. He began his career in 1914, as machinist, at the company's Pershing Road plant in Chicago, after having been graduated from Williamson Trade School. He successively held the positions of rate setter, subforeman of shop, head of time study department, works engineer, general superintendent and assistant general manager. During the war, Mr. Berry was vice president and general manager of the wartime subsidiary Link-Belt Ordnance Company, now dissolved. He became vice president of the parent organization on January 1, 1944. He was also a vice president and director of Link-Belt Speeder Corporation.

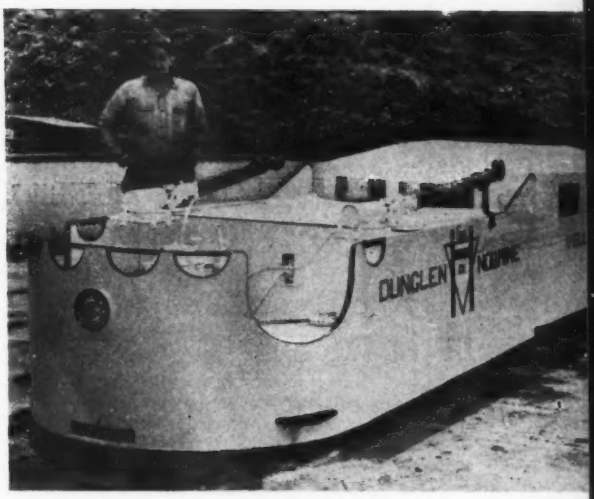
Bruce G. Shotton, for many years manager of the Pittsburgh office of the Hendrick Manufacturing Co., was killed by an automobile at Marietta, Ohio. Funeral services were at Car-

bondale, Pa., on April 14. Mr. Shotton was active in the affairs of the Manufacturers Division of the American Mining Congress and chairman of the Division in 1937. Being a man with unusually wide acquaintanceship throughout the coal industry, his loss will be keenly felt.

Andrew Nesbit, 73, retired Butte County, Calif., mining engineer, died at his home in San Leandro, Calif., recently following a stroke. He had been associated with the Butte Consolidated Placer, Thurman Dredging, and J. J. Raskob mining enterprises, British Malaya tin mines and other domestic and foreign mining companies. He retired in 1941.

William Benjamin Stuart, well-known in mining circles throughout the Northwest, died recently at the age of 83, at St. Joseph's Hospital in Chewalah, Wash., following a two-weeks illness. Prominent in the Northwest Mining Association, he was identified with the mining industry for a number of years.

NEWS and VIEWS



This motorized underground ambulance is equipped with a safety top, heating devices, and first-aid supplies. Installed at one of the mines of Pittsburgh Consolidation Coal Company, it is always available for immediate call

Eastern States

Coal and Electrical Engineers Hold Meeting

Opening a two-day meeting of interest to electrical engineers in particular and the coal industry in general, a varied program was conducted at Beckley, W. Va., April 11 and 12, by the New River and Winding Gulf Electrical and Mechanical Institute.

The occasion was the group's fourth annual joint meeting with the American Institute of Electrical Engineers and the American Mining Congress Committee on Underground Power, of which C. C. Ballard is chairman. The April 11 meeting, which continued from shortly after noon until late evening, was followed by a joint meeting of the Committee on Underground Power and the American Institute of Electrical Engineers, including the New York and West Virginia branches.

The opening speaker, T. R. Weichel, of Mount Hope, gave an interesting talk on "Safety Grounding Mining Equipment," which stimulated a spirited discussion from the floor. Time for such discussion was allowed after each address.

An address on "The Future of Atomic Energy," by Dean C. B. Blackwell, of Morris Harvey College in Charleston, highlighted and concluded the opening afternoon session.

Dean Blackwell, who is nationally known in the field of scientific research, pointed out that there is enough uranium ore in the United States to supply the country's need of energy for the next 200 years and enough ore in Canada to supply the entire world for 1,000 years.

C. B. Peck, Jr., product specialist for the Anaconda Wire and Cable Co., of New York City, spoke on "Mining Cables—Present and Future."

One of the most interesting discussions of the afternoon was presented by J. R. Casey, turbine division of the General Electric Co., whose subject was "The Gas Turbine as Applied to Aircraft." Mr. Casey showed an educational and interesting film in partial color showing the principle of jet propulsion and its application.

After a turkey dinner at the Methodist Temple, the engineers returned to the Memorial building to witness an interesting exhibit of various lighting sources, demonstrated by T. F. Adair, of the Westinghouse Electric Corp. lamp division.

New Coal Mine to Be Developed

Consolidation Coal Company of Kentucky, will place contracts and start work on the development of a completely new mechanized mine in the area of the headwaters of Rockhouse Creek, in Letcher County, Ky. The Louisville and Nashville and the Chesapeake and Ohio Railways will construct spurs to serve the operation. The new mine will produce from the Elkhorn No. 3 Seam and is expected to attain a maximum capacity of 4,000 tons daily. A complete washing and screening plant will be erected at the property. Tonnage from the Jenkins and McRoberts area will be replaced gradually by production from this new mine since the two former operations will go on a reduced reduction schedule within the next 5 years.

Stripping Operation Will Open

The P. & O. Construction Co., at St. Clairsville, Ohio, is planning to open soon their No. 1 strip operation near Adena, in Harrison County, Ohio. This operation is located on the Wheeling and Lake Erie Railroad and employs 80 men. The anticipated tonnage is 1,500 per day and the life expectancy is 10 years.

Coal Miners' Efficiency Increasing

The efficiency of the average coal miner employed by Pittsburgh Consolidation Coal Co. increased in 1946 and he produced more tons per day actually worked, it was disclosed in the company's annual report.

George H. Love, president, told stockholders in a letter accompanying the report that 1,500 tons of coal were turned out last year by the "average" miner in his firm. Although that was a lower output than in 1945, due to 60

L. E. YOUNG
Consulting Engineer
Mine Mechanization
Mine Management
Oliver Building Pittsburgh, Pa.

days of lost production involved in strikes, it represented an increased individual efficiency, as the result of greater skill by the miner and the use of newer and better tools.

Pittsburgh Consolidation's average worker in underground mines produced 7.35 tons per day worked as compared with the national average estimated at 5.1 tons. But at the same time his wages were $800 less than they would have been if strikes had not occurred. He earned an average of more than $13 a day for each day worked in 1946.

For the industry as a whole, however, Mr. Love's letter said the gain in wage rates by miners has "far exceeded the improvement in productive efficiency." "While the productivity of the miner has increased by 25 per cent during the last 10 years, his wages have increased at a far greater rate," Mr. Love said, "so that today for $10 in wages we are only producing 4.9 tons as against 8.2 tons produced 10 years ago for the same $10."

A Prediction for Coal

The coal industry is faced with increased competition from natural gas and petroleum products and reduction in demand resulting from a more efficient use of coal, James D. Francis, president of the Island Creek Coal Co., says in his annual report.

Over the next five years, however, Mr. Francis sees a market for a substantial volume of coal. He bases this expectation on increased population, construction of new homes, factories, and a strong demand for durable goods. However, the market for coal can be upset by strikes, general industrial unrest, and unsound governmental policy, he says.

Production of coal by Island Creek, a leading bituminous company, was reduced by the 57-day strike last year to 6,839,694 tons from 7,679,515 tons in 1945. Additional mines will be brought into production which will materially increase the annual capacity.

Possibilities of Gas Turbine Locomotive Stressed

The gas turbine locomotive burning powdered coal offers the best possibility of achieving a real cut in railroad fuel costs and for preserving bituminous coal as the dominant railroad fuel, said Charles F. Kottcamp, of Baltimore, Md., April 3, before over 200 members and guests of the Central West Virginia Coal Mining Institute in its first regular monthly meeting of this year at the Fairmont Hotel, Fairmont, W. Va. Mr. Kottcamp is assistant to the Research Director of the Locomotive Development Committee of the Bituminous Coal Research, Inc., which sponsors the developmental program to achieve the coal-fired gas turbine locomotive.

Explaining the research program, by presenting lantern slides, giving latest test data on coal pulverizing, fly ash removal and combustion, Kottcamp stated that the first two experimental coal-fired gas turbine locomotives should be on road tests a year hence. The pilot plant now operates at the Dunkirk, N. Y., works of the American Locomotive Company. The two experimental plants' prime movers are being built by Allis-Chalmers and Elliott.

Unusual Safety Record

S. J. Chewning, supply foreman for Consolidation Coal Company, at Jenkins, Ky., has established what is believed to be a record for working safely in the coal mining industry, having gone 137 months, over 11 years, without a lost-time accident under his supervision. Chewning and his crew of 12 men handle all kinds of mine supplies, such as timber, cement, pipe, steel rails, brick, ties, etc., and mining machinery of every description. During 25 years of employment as a foreman, only two lost-time accidents have occurred under the supervision of Chewning. He attributes his success to the fact he remains constantly with his crew, watching and guarding against accident hazards, and in selecting employes who strive to work safely.

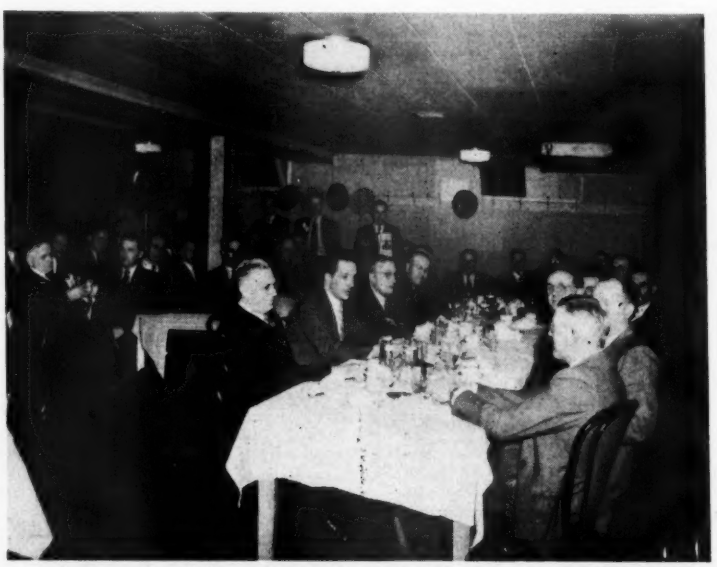
Anthracite Conference Held

The 5th Annual Anthracite Conference took place at Lehigh University on May 8 and 9. Chairman of the meeting was Dr. Alfred C. Callen, Dean of the College of Engineers at Lehigh University. Address of welcome was made by Martin D. Whitaker, president of the university. The two-day meeting included seven sessions with a total of 19 papers presented by anthracite engineers, operators and service men. Amongst the topics discussed were: radiant heating, stokers, the development of the "Anthratube," anthracite markets, the use of anthracite cupola fuel, sizing, gasification, labor relations and safety, mining methods and research. The annual dinner took place on Thursday evening, May 8, at the ballroom of the Hotel Bethlehem.

Three Thousand Coal Cars Needed

Chesapeake & Ohio Railway directors recently authorized inquiries for bids on 3,000 70-ton all-steel hopper cars to meet anticipated increases in coal traffic on the road.

To expedite construction and delivery, the bids will be based on the builders' own specifications rather than those of the buyer. The cars will be of the friction bearing type, because a number of them probably will be used in off-line service. Until such time as other railroads buy roller bearing cars and provide proper maintenance of them, the railway's announcement stated, the C. & O.'s equipment of this type will be confined largely to on-line operations.



Luncheon meeting of the Power Committee, Coal Division of the American Mining Congress, Beckley, W. Va., April 12

Steel H Beams Aid Efficiency

The Pursglove Mining Co., at its No. 15 mine at Pursglove, W. Va., is using three 7-ft. lengths of steel H beams, welded together and reinforced by steel bands at the welds, to increase efficiency of loading machines and providing maximum overhead protection. Three H beams are carried to within 3 ft. of the face. They are moved up as soon as place is loaded out. Use of these beams instead of wooden cross bars, with timber jacks replacing wood posts for the legs, eliminates the need for posts set out from the rib. Old method meant that coal had to be either shoveled by hand or the posts moved so the loading machine could get coal along the ribs.

Exploration Activities to Be Expanded

Freeport Sulphur Company contemplates expanding its exploration activities for sulphur and other minerals, the annual meeting was informed in April.

Production of nickel oxide by Nicaro Nickel Company, a subsidiary, was discontinued, shareholders were told. This represented a Government operation.

It is contemplated that the Cuban Mining Company will convert its manganese plant into production of Portland cement.

Gasification Test Results

The three objectives of the underground gasification project reported in the March issue of MINING CONGRESS JOURNAL and conducted by the Alabama Power Company and the Bureau of Mines at Gorgas, Ala., were to determine: 1, the quality of the gas produced; 2, the ability to control the fire; 3, the efficiency of combustion.

The Gorgas project, several weeks ago, demonstrated that gases, sometimes approaching 290 Btu. per cubic foot in quality, could be obtained from underground gasification and also that a controlled fire could be maintained. However, there still remained some doubt as to the completeness of combustion in an underground fire. An investigation was not possible until the week of April 7, when following the quenching of the fire, a portion of the hilltop was scraped away and tunnels were driven to determine the efficiency of combustion.

It was reported that the coal had been completely burned into the center pillar about 7 ft. from the inside face of the gangway. The complete burnout at Gorgas is encouraging, particularly since there was a feeling that the probable efficiency of underground combustion would not be high.

Starts Here . . .

It's time to take active protective measures against the explosions and mine fires which often result from faults in your electrical distribution system. And, mine sectionalization, utilizing the I-T-E Type KSC Automatic Reclosing Circuit Breaker, provides a logical starting point.

At the first sign of danger from electrical disturbances in mine trolley wires or feeder circuits, the KSC goes into action. It automatically opens, and remains open, until danger passes and line conditions return to normal. Then, it automatically recloses to continue normal operations.

Properly applied in mechanized mines, the Circuit Breaker protects electrical feeders and equipment in each section—isolates the effected area and prevents trouble in one section from penalizing others.

You can get complete details on this equipment by writing for Bulletin 4611 to I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pa.

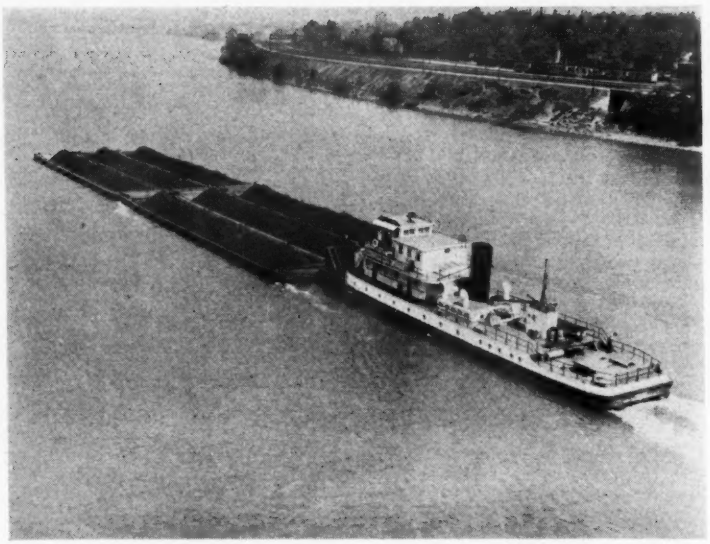
Be Wise . . .

SECTIONALIZE

Assure maximum protection for your electrical system with the I-T-E Type KSC Circuit Breaker—the breaker with the *automatic reclosing* feature.

Examine the KSC, talk protection with our engineers—when you visit our Booth No. 1303 at the American Mining Congress Show in Cleveland, May 12–15, 1947.

SECTIONALIZING SWITCHGEAR



An Ohio River towboat, the "Victory," built in 1940 by Dravo Corporation, Pittsburgh, has been sold to the Government of Argentina to aid in development of inland river transportation in that country. The twin-screw, Diesel-powered craft will make the sea voyage to Buenos Aires under her own power and towing four new sand and gravel barges also sold to the South American republic. The 760-horsepower "Victory" is shown here pushing six barge loads of coal from a Monongahela Valley mine to a steel plant along the Ohio River

"The Story of an Ore Sample"

Engineering societies, mining schools and colleges will be interested in a new Kodachrome 16mm. sound film entitled "The Story of an Ore Sample," recently released by the American Cyanamid Co., and produced by the Hamilton Wright Organization of New York.

The picture opens with scenes of a prospector in the field with his burro searching for ore. The sample that he collects is followed from the time it is unearthed to the Cyanamid Mineral Dressing Laboratory. Here the sample undergoes assay followed by a complete qualitative analysis, using the latest spectrographic and microscopic techniques. The sample is also tested for froth flotation, cyanidation and heavy-media separation. At several points in the film, animated diagrams serve to illustrate the separation processes used. At the end of the picture a complete report is mailed to the prospector and his company.

The picture is comprehensive, fast-moving, and excellent use has been made of color. The film has definite educational value and although produced for mining technicians and mining college personnel, it should also be of interest to any well-educated layman who is interested in mining.

Research Program Planned

The bituminous coal industry announced April 24 that it is making plans for "conducting research into new mining methods," with a view to reducing production costs. This announcement was made during a special meeting at Pittsburgh under the auspices of Bituminous Coal Research, Inc., national research agency of the industry.

A large group of coal, land and railroad company executives attended the meeting called to consider "ways and means for rapid advancement of mining machines and methods to reduce the cost of coal production." The officials in attendance represented producers of over 200 million tons of annual bituminous coal production, owners of substantial coal land acreage and leading coal-carrying railroads.

The program presented to the group contemplates raising a special fund to finance a new research activity of the industry, naming a Mining Development Committee of top-level executives representing the sponsors, and consulting with mining machinery companies as the development plans are being formulated.

Invitations to participate in this proposed program are extended to all commercial and captive coal operating companies in the United States, all coal land companies, and the railroads handling bituminous coal traffic.

"The entire object," said Howard N. Eavenson, president of the BCR agency, "will be to develop the best methods for mining coal cheaply just as rapidly as can be done."

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Central States

Studies in Drilling Procedure

The Eagle-Picher Mining and Smelting Company has been actively engaged during recent years in mechanization of its zinc-lead mines in the Tri-State Mining District. Many outstanding advancements in various mining machinery types and their uses have been accomplished. The company has assisted in permitting research studies of these new developments by the Mining Department, Missouri School of Mines and Metallurgy. As a result, data of practical character have been gathered for interpretation. In particular, the possible applications of the principles involved have been studied with the view toward their applicability in other mines.

J. D. Forrester, head of the Mining Department, and James F. A. Taylor, Research Fellow, conducted an original field study of some of the changed mining methods and the findings of their research titled, "A Comparative Analysis of Some Recent Mining Practices in the Tri-State Mining District," were published as a bulletin of Missouri School of Mines and Metallurgy, Vol. 16, No. 1, 1945. This study revealed that some questions concerning the effects of the new drilling practices were reflected in, or to some degree tended to influence, man-power efficiencies during mining. That is, it became apparent that a rounded, complete interpretation of the effects of the modified drilling procedures would further entail an analysis of manpower efficiencies which were accruing because of changed conditions. Accordingly, Forrester and Julian A. Fuller, Research Fellow, undertook to gather field data to analyze such relationships. Their study has been completed and now has been published as: "An Analysis of Manpower Efficiency in Drilling Procedures in the Tri-State Mining District," Missouri School of Mines and Metallurgy Bulletin, Vol. 17, No. 1 (Technical Series), March, 1946.

By means of time studies made of both the old and the new drilling procedures, comparative statistics were gathered of manpower efficiencies that indicate as follow:

1. The work required per man for three men to operate two post-mounted drills is greater than that of two men in operating one post-mounted drill. This is expectable, of course, but it should be borne in mind that in the former operation, two drills are simultaneously doing productive work and thus, the total footage drilled in a shift is greater than that for a single post-mounted drill operated by a two-man crew. Three men can operate two post-mounted drills much more efficiently than can two men run a single drill. This is particularly true where the drills are operated in close enough proximity to allow a helper to serve the two drill-runners without delay or confusion.

2. Although helpers aid directly the operation of jumbo drills in some phases of drilling and thereby increase somewhat the total feet drilled per shift by a jumbo unit, more economical and efficient results accrue, from the overall standpoint of mining, when both long-sash jumbos and short-sash jumbos are operated with drill crews comprised only of drillers. That is, it is concluded that it is cheaper and better mining practice to operate jumbo units without helpers since the effect of their absence does not pronouncedly reduce the footage drilled during a shift.

Hibbing Mines Building

An $83,000 appropriation, making a total of $233,000, insures the construction of the State Mines Building at Hibbing, Minn. The original appropriation was made when building costs and materials were much lower, hence the $83,000 was necessary to cover increased costs. Construction will begin as soon as the weather permits.

Annual Summer Meeting

The Illinois Mining Institute will hold its 27th Annual Boat Trip and summer meeting leaving St. Louis Friday night, June 6, and returning Sunday morning, June 8. B. E. Schonthal, secretary-treasurer of the Institute, has announced that the maximum capacity of the boat is 100 people and therefore, early reservations will be given preference.

Copper Range Co. Leases Smelter

The Copper Range Co. recently announced from Houghton that it has leased its Michigan smelter property to the Lake Copper Refining Co., a Michigan corporation, which will engage in the smelting of cathodes and high grade scrap copper.

Lake Copper Refining Co. is a new subsidiary of the Materials Surplus Corp. of Stryker, Ohio, which operates a number of plants throughout the

"And A Good Time Was Had By All"

Representatives from roughly 35 mines in Illinois and surrounding states were on hand for the "Red Necktie Barbecue" tendered members of the coal industry, on Mitchell Day, by Central Mine Supply Co. The party was held on the farm site of A. E. (Red-Necktie) Pickard, president of the company, near Cairo, Ill. About 300 guests attended, and so successful was the event that it is planned to make it an annual affair

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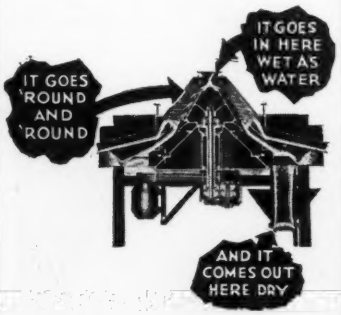

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country. John M. Vivian, who was with the smelter organization under the Copper Range management, will be in charge of the new industry.

Leases Awarded on Gogebic Range

The Department of Conservation, State of Michigan, has awarded the Syracuse Mining Co., Cleveland, Ohio, leases on state-owned lands for iron ore exploration and mining purposes. The lands include a total of 850 acres in Gogebic County, Mich. Syracuse Mining Co., in compliance with the terms of the lease, will have to expend a minimum of $15,000 for exploration purposes on these lands or in the vicinity thereof during the first year of the lease. For the second and succeeding years of the exploratory period the sum of $10,000 will have to be spent for exploration activities. The royalty rate is on a percentage basis rather than a flat royalty per ton.

Smelter to Be Enlarged

American Smelting and Refining Company has started construction work on an addition to its smelter at El Paso, Texas. The new unit, an entirely separate plant, is designed for the recovery of zinc from the slag dumps which have been amassed over a long period of years. According to R. D. Bradford, general manager of the El Paso smelter, the accumulation of lead slag is deemed of sufficient proportions and value to justify the installation of the zinc plant. Contracts for the work have been let, equipment has been ordered, and the completion date set for the spring of 1948.

The process to recover zinc from slag was perfected in 1920. The first such plant was built by Anaconda Copper Mining Company at East Helena, Mont., and has been operating ever since. In 1940 and 1941, similar plants were built by the Bunker Hill and Sullivan Mining and Concentrating Company at its Bunker Hill smelter, Kellogg, Idaho, and by International Smelting & Refining Company, at Tooele, Utah. A fourth plant is operated by the Consolidated Mining and Smelting Company at its Trail smelter in British Columbia.

The recovery method involves remelting the slag in a blast furnace and blowing powdered coal and air into the molten slag. The zinc content removed is zinc oxide fume which is caught in woolen bag filters. This substance is a white powder which will be loaded into cars and shipped to the American Smelting and Refining Company's zinc smelter in Amarillo, Tex., for reduction to zinc metal for market.

One important item of expense for the fuming plant will be the filter bags which are made of the best virgin wool obtainable. There will be 1,000 of these bags, each 18 in. in diameter and 30 ft. long. The cost of each is estimated at $28.

The bag house will be 50 ft. wide, 350 ft. long and 60 ft. high. The building for the furnace will be 150 ft. long and 100 ft. wide. In addition there will be a plant to pulverize the coal needed in the operation.

During the construction period approximately 150 men will be employed,

The flexibility of truck operation is demonstrated by this recent photo taken on the Mesabi Range

and when completed the plant will require an operating crew of 50. This number will be in addition to the 750 employes at present on the smelter payroll.

The plant under construction is only for the treatment of the slag dumps and no provisions are being made for the treatment of zinc ores on a custom basis.

Zinc Demand High

Demand for all products from the properties of American Zinc, Lead & Smelting Co. at present is equal to or in excess of production, Howard I. Young, of St. Louis, president, told stockholders in a report covering 1946 operations. Mr. Young stated that the company anticipated that all plants will be operated at maximum capacity throughout 1947.

The report noted that Government subsidies continued throughout 1946, and the present law expires June 30, 1947.

"With improvement in the price of zinc products under open market conditions and adequate manpower for capacity operations, we anticipate the over-all operations of the company can be conducted on a profitable basis, even though the premium price plan is not continued," Mr. Young said.

He added, however, that the elimination of this plan on June 30, would probably result in the closing of some of the company's marginal mines.

Iron Mining Resumes

The Oliver Iron Mining Co. began the 1947 ore season in April with small-scale loadings at the Hull-Rust-Sellers pit, at Hibbing, Minn.

The mines are expected to work at capacity this season but full-scale operations await the arrival of boats from the lower lake ports.

Back in production this season after being strike-bound for more than a year are the Agnew, Sargent and Hawkins mines, formerly operated by the International Harvester Co. The mines are now being operated by the Cleveland Cliffs Iron Co.

At least two new properties will be opened on the east end of the Mesaba. The Oliver is extending its operations from the Richeleau reserve through the Ohio mine property with available tonnage of 2,717,374, and the Lone Jack with 985,068 tons available into the Messabe Mountain pit, now operated by the Charleston Mining Co.

Summer Plans on Mesabi Range

The outlook for mining operations of Butler Brothers on the Mesabi Range, which includes the Weggum mine east of Hibbing and the South Agnew mine to the west, appears very promising, according to information in *The Butler Miner*, official organ of the company on the Range.

Loading of ore from stockpile started at the Weggum mine with the opening of navigation. Present plans call for a six-day week, one shift operating from May 1 to late fall. At least one of the additional shifts will be used for washing custom ores from an adjoining mine.

The spring breakup necessitated stopping of stripping at the South Agnew mine but resumption is anticipated by May 15.

It is expected that between 50 and 100 men will be occupied at different times during the summer setting up the belt conveyor system, screening plant and drag line, as well as constructing a mine office and other necessary buildings.

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TREASURE MAP OF INDUSTRY

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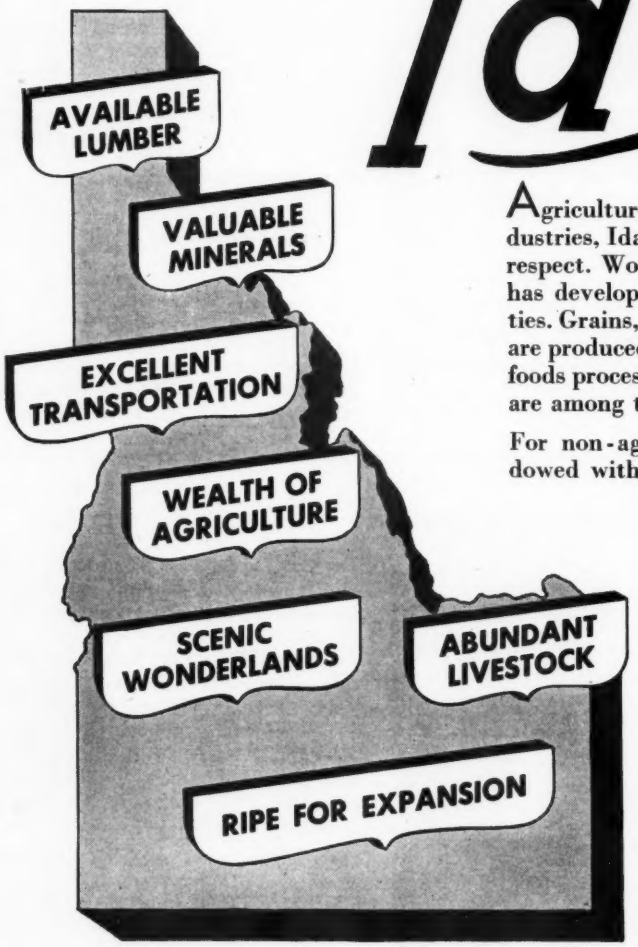
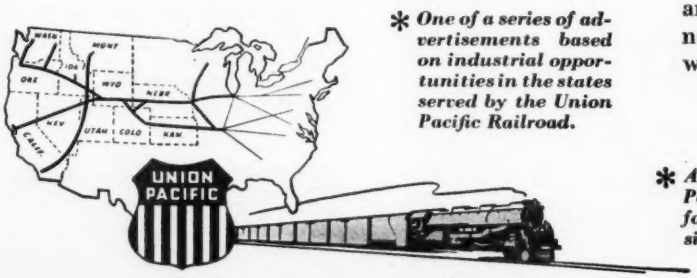


Agriculture being the life-blood of many industries, Idaho is particularly fortunate in that respect. World-famous for the Idaho potato, it has developed many other agricultural activities. Grains, vegetables, fruit... cattle and sheep are produced in abundance. Dehydration, frozen foods processing, dairying, canning and packing are among the state's flourishing industries.

For non-agricultural industries, Idaho is endowed with rich veins of minerals. Numerous manufacturers of stone, clay and glass products have established plants in Idaho. Lumber for building and wood products is available. Unsurpassed rail transportation is provided by Union Pacific.

As a vacation region, Idaho has a wonder-world of its own in Sun Valley . . . year-'round sports center... the world famous primitive area . . . and in the scenic surroundings of Payette Lake.

Idaho is a young thriving state, ripe for further industrial development. It offers good living and working conditions, good schools, splendid cultural advantages . . . and its energetic citizens assure newcomers of a true western welcome.



* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

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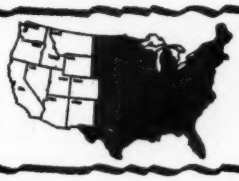
Western States



Shaft to Be Unwatered

Six carloads of oxidized copper ore have been shipped by Southwestern Mines, Inc., Courtland, Ariz., from its Brown shaft. This ore, sent to the Phelps Dodge smelter at Douglas, averaged between 4 and 5 per cent copper. The Leadville shaft has been retimbered and is fully equipped for mining. In addition, the power line has been extended to the Highland shaft, hoist and headframe installed, and the necessary retimbering completed to make possible the unwatering of workings to the 350-ft. level. When power connections are made, the pumping equipment already on hand will be placed to complete the unwatering of the Highland shaft. Mining on the sulphide ores will then be started. J. S. Coupal, of Phoenix, is the company's consulting engineer.

Bureau Observes Anniversary

The New Mexico State Bureau of Mines and Mineral Resources at Socorro in April observed its 20th anniversary. First director was the late Dr. E. H. Wells, who also served as president of the New Mexico School of Mines. Present director of the Bureau is Dr. E. C. Anderson. In its 20 years the Bureau of Mines has conducted innumerable investigations and surveys of the state's mineral resources and completed and published 27 major bulletins and 15 lesser reports.

Retimbering Progress at Old Shaft

Retimbering of old Eureka shaft to the 3,500-ft. level of Central Eureka mine at Sutter Creek, California, has been completed. This will permit the driving the 3,500 south drift to the Central Eureka shaft and repairs in the north drift to the ore body. Necessary timber has been received for operations well into 1947.

Colorado Mine Adds New Equipment

Henna Mines Co., near Boulder, has completely reequipped the Cash mine, having installed an electric hoist, a tugger hoist for underground use, electric pumping equipment, blacksmithing machinery, headframe, ore bins, and compressors with capacity for ten rock drills. The shaft of the Cash has been retimbered to the tunnel or 130-ft. level which has been cleaned and retimbered. Ore has been found along with some free gold specimens.

This company has also developed shipping ore in the Bellevue mine and in the Hazel A.

Gold Property to Be Reopened

Early resumption of work at the Oregon King mine near Madras, one of the heaviest producers of gold and silver in central Oregon, but closed since war days, now is expected. The owners of the property attempted to resume operations last spring but were forced again to close after a brief start for lack of labor as well as the inability to get pumping machinery.

Mining Property Purchased

The Nancy Lee mines, near Superior, Mont., recently bought the Signal Mining Co. property in the Pine Creek district. Also acquired is a working contract on the adjoining Amy-Matchless property, with its 125-ton mill and 400-ton sink float plant.

New Work Opens Black Bear

One of the most interesting development programs in the history of Colorado metal mining has attained its objectives at the old Black Bear mining property in the San Juan district. The Idarado Mining Co., a Newmont subsidiary, has completed development that makes the lead-copper and zinc ore bodies in the Red Mountain property on the other side of the range available through the Treasury tunnel.

The Treasury tunnel had been drilled some 5,000 ft. westward toward its objective, the downward extension of the Black Bear vein, when the Idarado took hold. An additional drive of 7,000 ft. was completed to the vein and then a raise of 1,100 ft. was run to the bottom of the old Black Bear shaft workings high up on the mountain.

The 1,100-ft. raise from the Treasury tunnel to the sixth level of the Black Bear on the Telluride side has been completed, according to Fred Wise, general manager, but it will require some time to put the old workings in shape so that the ore from the property can be taken out.

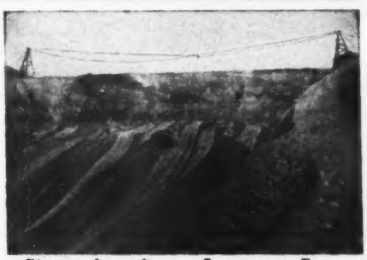
There is considerable milling ore in the old Black Bear which can now be brought out through the Treasury tunnel and milled in the Treasury mill on the north side of the range.

From the sixth level it will be possible, as the workings are rehabilitated, to reach all sections of the Black Bear and operate in any of the levels as feasible. The combining of the two mines connects mineralized holdings on both sides of the range and makes one of the most extensive and valuable properties in the San Juan range.

Mine Temporarily Closed

The Mt. Hope unit of the Callahan Lead-Zinc Company, 26 miles north of the famous old camp of Eureka, Nev., has ceased production for a time due to a recent fire which destroyed the power house and shop of the mine. The Mt. Hope has been a steady producer for the past two years, averaging 200 tons of lead-zinc-cadmium ore daily, and employing an average of 80 men in mine and mill. It is currently reported that a new power house will be built and production resumed in the near future.

DIG and HAUL
the **SAUERMAN** *Way*



Picture shows how a Sauerman Power Scraper at nickel mine in Canada digs into hill and moves material down to a raise to backfill a worked out stope.

You can move any loose materials—coal, ore, sand, gravel, clay—fast and efficiently with a Sauerman Power Scraper. One man handles the entire operation through simple automatic controls. Operating range is easily extended. Sturdily built for long, low-cost service. Electric, gasoline, Diesel or steam power.

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on the plan that delivers Peace of Mind

THANKS to the work of patriotic volunteers, the U. S. Savings Bonds program has carried America a long way up the road to economic security.

During 1946, in spite of all the problems and uncertainties the nation faced, sales of Savings Bonds *exceeded redemptions* by $1,389,216,000. The success of this great sales operation has helped stem the tide of inflation, has reduced public debt holdings of the banking system, and has given millions of citizens a stake in their country and a profitable investment in their own futures.

Yes, we've come a long way—but the trip isn't over! Now is the time to check up on your Payroll Savings Plan. Make sure that all your new employees are familiar with its advantages. Remind *all* your employees that there's no easier, surer way to build their own futures—and America's—than by buying Bonds regularly through the Payroll Savings Plan. Every $3 invested pays $4 at maturity!

For any help you need in conducting the Payroll Plan, call on your State Director of the Treasury Department's Savings Bonds Division.

New Savings Bonds Plan won't affect the P.S.P.

SOON the Treasury Department and the banks of America will make it possible for farmers, doctors, and other self-employed people to participate in "automatic" Bond buying by special arrangement with their banks. This extension of the Savings Bonds program is not a partial payment plan and is intended *only* for people who are not in a position to take advantage of the Payroll Savings Plan.

The Treasury Department acknowledges with appreciation the publication of this message by

MINING CONGRESS JOURNAL

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

Flotation Mill Now on 24-Hour Schedule

The Base Metals Co., of which J. B. Flowerree, of Spokane, Wash., is president, and C. L. Miles, secretary, treasurer and general manager is operating the Cleveland mine, in southwestern Stevens County, Washington. Operations of its selective flotation mill are on a 24-hour basis. Concentrates produced contain lead, silver and antimony.

Old District Shows Possibilities

One of the oldest and at the same time least known mining districts in Pitkin County, Colorado, is in process of development. The Lincoln Gulch area was mined in 1879 and 1880 by prospectors. Due to the inaccessibility of the county and the lack of transportation facilities the area was abandoned in 1893. There has been little mining other than prospecting in the region until 1935. Then Wm. R. Shaw and D. K. Shaw began securing titles to the area. During the past four or five years, geological and development work has been done. Results have shown values in gold, silver, lead and copper.

The country in which the property is located can now be reached by automobiles and trucks which will permit the shipment of lower grade ores than heretofore.

Activity at Tintic

Plans for extensive development of the holdings of the Chief Consolidated Mining Company in the Tintic Mining district, Utah, were recently announced.

Cecil Fitch, president and general manager, states that funds are now available for exploring to further depth the present ore bodies in the Chief No. 1 mine by 300 ft. of vertical sinking which will amount to 1,500 to 1,800 ft. on the projection of the ore. The company will then drift on the 2,800-ft. level, 300 ft. below the present lowest depth. Funds, he states, have also been provided to explore the north end of the company's Plutus mine from the Chief No. 2 shaft on the 1,600-ft. level and this work should encounter the projected known ore in this area. Plans have also been made for an exploratory program on the company's Evans group of claims. In addition, the Newmont Mining Company's program of development at the Chief's Apex Standard property is in full progress, all necessary preliminary work having been completed. Newmont is operating the Apex Standard property under lease. Another lease has been let to the International Smelting &

SEAL-TITE TAMPING BAGS

They're plenty tough wet or dry!

Streamlining your blasting operations with Seal-Tite Tamping Bags saves labor, speeds up shooting and reduces cost. Supplies of dummies are made up quickly and easily and are stored underground under humid conditions — and they're always handy and ready for use.

SEE THE SEAL-TITE DEMONSTRATION AT THE MINING SHOW

You'll be convinced when you see Seal-Tite Tamping Bags put to the severest of tests. They're even kept completely *underwater* for long periods. Then their tough chemically-treated, *high wet-strength* kraft is given the tear test in comparison with conventional bags. The safety-seam is submitted to pull-apart tests. You'll see for yourself and you're invited to make your own tests.

We'll send you samples of Seal-Tite Tamping Bags to try out — in the sizes you need — or in an assortment. Yours for the asking.

Tamping Bag Co.

216 SO. THIRD ST.
MT. VERNON, ILL.

Refining Company, which plans to develop a block of virgin ground from the No. 2 Chief shaft.

New Ore Discovered

New ore discoveries at the Horn Silver property, Beaver County, Utah, appear promising, according to Paul H. Hunt, president of the company. The property is under lease to Metal Producers of Los Angeles.

These new ore discoveries, Mr. Hunt states, continue to show persistence and are important in view of their location in a favorable limestone formation to the northwest in virgin sections of the mine below the 900-level.

Perlite Claims Purchased

The Snow White perlite claims four miles northwest of Superior, Ariz., have been purchased by the Great Lakes Carbon Company, of Chicago, Ill. Preliminary exploration of the deposit by diamond drilling has been started.

Great Lakes Carbon also proposes to work the Walker-Talley property south of Superior, near Arnett Canyon, and which has been in production for some time. Shipments are averaging 15 cars a month, the loading being done at the Magma depot.

A seven-car spur is being built on the Magma railroad where a crusher and loading bins will be erected to handle the Snow White production. Output from this property is expected to run four cars daily. All shipments go to the Great Lake Carbon Company's popping plant in Torrence, Calif., which has been enlarged to handle 300 tons daily.

Other perlite properties near Superior that are being worked are the John B. Wight and Ace Tomerlin one, leased to M. A. Edgar of New York, and the McDonald property on Queen Creek. Edgar is shipping about four cubic yards a day to the Williams Brothers' experimental plant in Phoenix, while McDonald has his own plant and sells the product largely for plastering.

Nevada Grubstake Bill

Under provisions of a bill passed by the recent Nevada legislature grubstake agreements must be filed with county recorders in the county in which claims are located. It is many years since there has been any grubstaking in Nevada. This time-honored method of financing for prospectors has been responsible for many famous ore finds in Western mining history and grubstaking has been responsible for the location of several Nevada mines.

Heavy Media Mill Working on Fluorspar

The Shattuck Denn Mining Corporation, Bisbee, Ariz., acting as agent for the Reconstruction Finance Corporation, is operating the Gila Fluorspar Project's heavy media mill on the Gila River, 30 miles west of Silver City, N. Mex. H. R. Hendricks, chief metallurgist for Shattuck Denn, is in charge of operations at the mill. Coyne Hunt, of Bisbee, is plant superintendent. Operating on a two-shift day, approximately 200 tons of ore is treated in the mill daily.

New Magazine Authorized

Expansion of the *New Mexico Miner & Prospector*, official publication of the New Mexico Miner & Prospectors Association, into a statewide mining magazine, published monthly at Albuquerque, has been authorized by the Association. Established in 1939, the magazine will continue to be directed by Don Lusk, as editor, with Jack C. Pierce, Albuquerque, the business manager.

Silver Summit Shaft Completed

Polaris Mining Company's report for 1946 announces the completion of the Silver Summit three compartment shaft to the 3,000-ft. level. Shaft sinking on this Idaho property was started on the 1,500 level on February 1, 1946, and completed to the 3,096-ft. level on December 8; an average of 159.6 ft. per month, a record in the Coeur d'Alene district. The company has started a crosscut south from the 3,000 level which will eventually traverse the entire silver belt structure. On April 2 this work had been advanced a distance of 482 ft. and was progressing at the rate of 15 ft. every 24 hours. This crosscut will also develop Silver Summit and Chester ground, in both of which Polaris holds the controlling interest, and ground owned by the Merger, Mineral Mountain and Yakima-Shoshone Mining companies, in which Polaris holds a 50 per cent production interest.

Gold Camp for Sale

Rhyolite, a famous gold camp during the boom days of Goldfield and other southern Navada camps, is being offered for sale by N. C. Westmoreland. The camp once boasted two banks, a newspaper, a school which cost $50,000, a substantial residential section, and a railroad. Much of this has vanished, but the stucco depot of the Tonopah & Tidewater Railroad is now used as a night club. There is little or no mining activity.

New Ajo Housing Project

Plans for the construction of 50 residences in Ajo, Ariz., have been announced by E. Wittenau, manager of the New Cornelia Branch, Phelps Dodge Corporation. Work on the project is to start in the near future.

The houses are to be located in various parts of the Ajo townsite, on lots now vacant. The type of construction will vary and each residence is to conform to the style of architecture in the particular neighborhood. Thirty of the houses will be of the two-bedroom type and 20 will have three bedrooms. Progress on the program will be governed by the availability of labor and supplies.

The company also is planning for the construction of a modern change room in the plant yards. These facilities are to be large enough to accommodate all employes working in the area, such as concentrator and mechanical department employes. Other construction under consideration is an extension of the warehouse and paint shop buildings, and a new freight warehouse for the Tucson, Cornelia and Gila Bend Railroad.

New Placer Operation

A. B. Woodward, Jr., engineer in charge of installing 400 tons of placer dredge equipment for Kern Placers, Inc., on the Hammond ground near Randsburg, Calif., expects to have the plant in operation shortly. The plant will be floated in a dredge pit 60 x 100 ft. and 25 ft. deep, water being supplied from wells a mile distant. A 175-walking Monighan dragline has been completely assembled for the job.

Steady Silver Production Under Way

Lucky Friday Silver-Lead Mining Company, in the Coeur d'Alene district of Idaho, has started steady production of high grade silver-lead ore from the 1,400 and 1,000-ft. levels and already has a stockpile of 1,500 tons ready for shipment to the Golconda custom mill. The company has been delayed getting into production because of development contracts with neighboring companies.

Borax Property Auctioned

A Los Angeles, Calif., group composed of Harvey S., Seeley G., and Henry T. Mudd and Geo. V. Dub, were the successful bidders for the Western Borax mine at the receivership sale of U. S. vs. Borax Consolidated, the price being reported as $500,000. Dub was formerly superintendent for Pittsburg Plate Glass Co., at their Bartlett plant. It is reported that the Department of Interior will open bids for the Little Placer Claim, adjoining the Western Borax mine.

Wheels of Government

(*Continued from page* 46)

"Water pollution is a local problem, varying widely in nature and extent, and best dealt with by States and local agencies, supplemented where necessary by interstate compacts. We oppose legislation vesting control over water pollution in a Federal agency with power to set rigid standards and to force compliance through action in the Federal courts."

The witness then stated that there is no problem of stream pollution in connection with mines which cannot be corrected by proper State and local law and regulations. He emphasized that the bill before the committee follows a pattern which has grown all too familiar and is but another step in the centralization of power in Washington. He called upon the members of Congress to halt the totalitarian trend which has become manifest and to assert once again the authority of the Congress to define and jealously guard the policies under which the people of our nation should be governed. Mr. Callahan stated that mining men are willing to cooperate in the true American manner, but object seriously to the passage of legislation which would subject the mining industry to control which can serve no good purpose but would constitute a constant threat to the production of metals and minerals essential to our national economy and safety.

Robert M. Searls, representing California mining operations, pointedly opposed the jurisdiction conferred by the bill upon the Surgeon-General to bring injunctive suits which would extend to the utmost tributaries of the nation's streams. He stressed the fact that States and local county governments are fully competent to handle the requirements of the widely varying situations and cited examples of destructive action through judicial intervention by the Federal Government which have taken place in past years. He declared that Congress could authorize a special commission to handle a pollution problem which became so acute that it could not be remedied through the operation of local laws and regulations, without blanketing the country with general controls.

Henry H. Otto of Scranton, Pa., joined in the opposition by presenting the position of the anthracite industry, explaining the impracticability of disposing of mine water in any other way than through the natural drainage channels provided by the streams and rivers of the region. He explained that under Pennsylvania law methods are being pursued to minimize the discharge of sludge and that the pending Barkley-Taft bill can serve no good end and will do harm.

A number of witnesses from the bituminous coal industry are scheduled to appear before the subcommittee on May 9 in opposition to the bill.

Coal Negotiations

Bituminous coal operators and miners' representatives met April 29 and 30 at the invitation of Coal Mines Administrator Collisson to consider negotiation of a contract and will resume discussions May 6. Government control of the mines will lapse at midnight June 30.

Meanwhile the Federal District Court has rebated $2.8 million of the $3.5 million assessed against the UMWA. The union paid its $700,000 fine as ordered by the Supreme Court. Judge T. Alan Goldsborough warned the union that the injunction preventing a strike against the Government remains in effect until June 30. The Justice had previously lectured the mine workers on the attitude which they had displayed in connection with the "mourning week", stating that the situation had been taken advantage of in an endeavor to, in whole or in part, cause the strike which was originally called for April 1. He also declared that John Lewis had displayed a contemptuous attitude toward the court's order when he spoke of the "Krug yellow dog injunction," before a committee of Congress.

Centralia Aftermath

Senator Cordon's (Rep., Ore.) Public Lands Subcommittee investigating the Centralia, Illinois, coal mine explosion received testimony from Interior Secretary Krug in mid-April. Krug sharply criticized the mine workers' non-cooperation in safety matters, charging officials with "an almost total lack of cooperation" and "an almost unbroken record of neglect" to promote mine safety. He emphasized that the miners' union could not have been ignorant of the fact that many, if not most of the violations of the safety code arise from practices of the miners themselves; that many of the deficiencies from Code standards cannot be cured until equipment can be obtained; that many inspection reports listed only trivial violations; that a mine cannot be inspected as to a majority of the Code requirements unless it is in operation, and that it would take months before the inspection of 2,500 mines could be completed.

Krug submitted a five-point program of recommendations: (1) the mine operators "should continue, with more dispatch and vigor, the program to achieve full compliance with the Federal Mine Safety Code"; (2) the UMWA should promptly initiate a thoroughgoing campaign to sell mine safety to its members; (3) future contracts between the operators and the union should continue the Federal Mine Safety Code and, in some form, the Health and Welfare Fund; (4) enactment of Federal legislation "to give the Bureau of Mines power to require the correction of unsafe conditions or practices wherever the mine inspectors may find them"; and (5) enlargement of the Bureau of Mines inspection force to 1,500 inspectors with an annual appropriation of $19,000,000 and an additional increase of $2,000,000 for "programs of research and of training coal miners in the necessary rudiments of mine safety." Krug stated that coal mining "could be made just about as safe as the average heavy industry," but that "there would still be a steady toll of deaths and injuries, and there will still be an occasional disaster."

At a later hearing before a House Labor Subcommittee Krug urged legislation giving the U. S. Bureau of Mines enforcement powers in connection with safety inspection. He was asked by Chairman Schwabe (Rep., Mo.) whether he included metal mines in his recommendations for enactment of such legislation. Krug replied in the affirmative and stated that Federal mine inspectors would make inspections of metal mines under such a proposal.

The Cordon Committee closed its hearings after receiving testimony from John Lewis on April 17, in the course of which Lewis again charged Secretary Krug with responsibility for the Centralia explosion. Lewis asked for legislation authorizing the U. S. Bureau of Mines to shut down mines not conforming with safety standards. He stressed that such legislation should specifically cover ventilation, gas and dust conditions.

There has been no further action on the Landis (Rep., Ind.) bill, discussed last month, but there is talk of a further mine inspection bill which may be introduced in the near future.

Premium Price Plan

The Russell (Rep., Nev.) bill, H. R. 2455, discussed in previous issues, has been reported to the House by the Committee on Public Lands and is now awaiting a rule for floor consideration. The bill was amended to reduce the authorization for payments from $100 million to $80 million dollars, and to limit the program to five years.

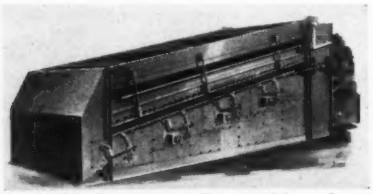
Meanwhile Senator Watkins (Rep., Utah) has introduced a bill which would make available the present unexpired appropriation for Premium Price Plan payments on a basis proportionate to those received by individual producers during the past year, either for mining of marginal ores that would otherwise be lost, or for exploration work. Such payments from the funds available could not be continued for more than three years.

MANUFACTURERS FORUM

New R & S Super-Airflow Cleans Fine Coal Smaller Than 10 Mesh

An entirely new Airflow Dry Cleaner for fine coal sizes was unveiled at the recent coal show by Roberts & Schaefer Company, engineers and manufacturers of coal cleaning equipment and preparation plants. Claims of cleaning for sizes smaller than 10 mesh have interested many operators who have heretofore discarded these finer sizes as refuse and now see marketability for a larger percentage of their mine output.

Specifically the new Super-Airflow offers a cleaning deck and resistance pack which oscillate as an integral unit with short, rapid strokes. The



deck is longer and provides four draws for better control of refuse. Less air volume is required for stratification because of the oscillation which assists the movement of material along the deck. The zoning plate has been eliminated since the shaking deck maintains a uniform bed automatically. Short oscillation permits tight air seal with rubberized fabric or canvas. Very fine refuse sifts through the deck to form a high ash hutch material which is removed by built-in screw conveyors.

Complete descriptive bulletins will be sent upon request to Roberts & Schaefer Co., 307 N. Michigan Avenue, Chicago, Ill.

New Type Cast Iron Electrode Announced by P&H

"Nicast" is a new P&H electrode reported by the manufacturer to put cast iron in a class with steel for ease of welding and finishing.

For maximum usefulness, it was made to operate on either AC or DC current. Welds produced by "Nicast" are strong and non-porous and fully machinable in both the weld and fusion zone areas. The unusual machinability of "Nicast" makes it possible to drill, tap, mill or machine weld deposits in any manner, shape or form.

This new electrode is ideal for repairing broken castings, building up worn castings, correcting machining errors and welding cast iron to steel.

Most applications require no preheating or post-heating and welds will withstand hydrostatic pressure. "Nicast" is an all-position electrode and performs well in flat, vertical, overhead or horizontal work. It is now available at P&H distributors in either ⅛ in. or 5/32 in. x 14 in. sizes. Further information can be had by writing Harnischfeger Corporation, Welding Division, Milwaukee 14, Wis.

Carbon Monoxide Detector Available

Manufacture of carbon monoxide detector tubes, invented and made during the war by the National Bureau of Standards, Washington, has been placed on a peacetime footing through sale of the bureau's equipment to the Mines Safety Appliance Co., Pittsburgh, Pa.

The tubes, covered by patents issued or pending, are in demand for use in mines, garages and various industrial plants and by health departments. Danger of carbon monoxide poisoning can be avoided by using the simple, relatively inexpensive devices, which indicate by a color as little as one part of dangerous gas in 500,000 parts of air.

The color indicator used in the detector is a yellow silica gel impregnated with a complex silico-molybdate compound and catalyzed by means of palladium sulfate. This mixture is placed in a 5-in. glass tube the size of a lead pencil, and air to be tested is forced through. The yellow indicator turns green if carbon monoxide is present, the degree of green indicating the amount of poisonous gas found.

This method of carbon monoxide determination will detect concentrations as low as one five-thousandth of one per cent which compares favorably with the chemical analyses which show concentrations as low as one ten-thousandth of one per cent. However, the accuracy of the visual color method must necessarily depend on the perception of color gradation by the individual whereby the chemical determination is made by use of a colorimeter which employs a supersensitive galvanometer. In other words, in the chemical method figures are read and in the tube method color shades are perceived and compared with a standard color scale.

Joy to Distribute Coalmaster Tools

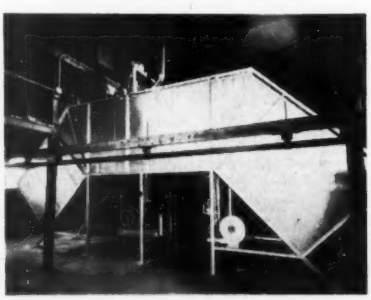
The Central Mine Equipment Company of St. Louis, T. E. Rassieur, president, recently announced the appointment of the Joy Manufacturing Company as a distributor of its nationally known line of Coalmaster drilling tools. Coalmaster drilling tools are widely used in underground and strip mining and in soil testing.

Other companies distributing the Coalmaster line include: the Austin Powder Co. of Cleveland, Ohio; the Buda Co. of Harvey, Ill.; the Diamond Supply Co., Inc., of Evansville, Ind.; Dooley Brothers of Peoria, Ill.; the Illinois Powder Manufacturing Co. of St. Louis, Denver and Salt Lake City, and the Salem Tool Co. of Salem, Ohio, in the domestic field, and Balimo, Ltd., of London, England, and British-American Industries of New York in the export field.

To this list Joy Manufacturing Co. brings its nation-wide system of sales representatives as well as its export coverage with subsidiaries and representatives in 57 countries.

Rust-Proofing by Infra-Red Rays

The Burdett Manufacturing Company has recently developed a new rust-proofing process which should be of considerable interest to the mining industry. The new burn-off rust-proofing process can be explained as the proper placing of gas-fired infra-



red burners in relation to the work, as determined by scientific standards. This process is claimed to not only remove grease and similar film, but simultaneously produce a blue surface on the metal that is extremely rust resistant. This blue surface can be best explained as a tight scale and is said to reach hidden surfaces that are not ordinarily reached by rust-resistant liquids, therefore a more thorough job.

Sheets treated by this new process have been tested under severe weather conditions for as long as five weeks without indication of rust. Tests have also been run in acid atmosphere with identical results. Paint technician analysis is to the effect that paint adhesion is equal or possibly superior to adhesion on surfaces treated with the commercial liquid rust preventives. Extensive research and tests have been said to prove that the rust-proofing phase of the burn-off operation can be accomplished only by a radiant heat burner with proper coverage of the work.

Detailed information may be had by writing direct to the Burdett Manufacturing Company, 3433 W. Madison Street, Chicago, Ill.

Believed to be the largest truck ever built, this 40-ton capacity unit was recently completed in the experimenal department of the Euclid Road Machinery Company. It is powered by a 12-cylinder supercharged Cummins Diesel engine of 550 horsepower. Gross weight of the truck with capacity payload is approximately 80 tons. Still in the experimental classification, this huge truck was shipped to a mining property of M. A. Hanna Co. on the Mesabi Iron Range in Minnesota, where its performance is being tested and observed by Euclid engineers. Future production plans will be developed after extensive field test

M.S.A. "Chemox" Creates Own Oxygen for Breathing

The MSA Chemox Oxygen Breathing Apparatus is a self-contained unit in which the wearer is independent of the outside air. It affords complete respiratory protection for a minimum of 45 minutes and generates its own oxygen for the wearer with a replaceable canister. It is made by Mine Safety Appliances Co., Pittsburgh, Pa.

Chemical evolvement of oxygen in the Chemox replaceable canister occurs by reaction with the wearer's exhaled breath and produces a supply of pure oxygen in exact accordance with his varying breathing requirements. According to the manufacturers, this apparatus has been used by the U. S. Navy in fire and battle conditions for more than four years and is now standard equipment in our peacetime Navy. The apparatus is officially approved by the U. S. Bureau of Mines under approval No. 1307.

Weighing only 13½ lb. complete, the Chemox is extremely simple to use and maintain—has no moving parts, no high pressure cylinders, valves or fittings. Insertion of a Chemox Canister prepares the apparatus for immediate use. The canister weighs only 4 lb. and can be stored indefinitely until used.

Illustrated bulletin, giving complete information, will be furnished upon request to the company.

CATALOGS AND BULLETINS

CHAIN BELTS. *Chain Belt Co. of Milwaukee.* Bulletin 46-10 lists Rex cast chain belts for drive and conveyor service. Photographic illustrations show the various types of chain belts and attachments are listed for conveyor chains. There are several illustrations of conveyor chain belts in use handling in material in sludge collectors, pan conveyors, and hoppers.

COAL CRUSHERS AND BREAKERS. *McNally-Pittsburg Manufacturing Corp.*, Pittsburg, Kans. In Bulletin No. 342 the full line of McNally-Pittsburg coal crushing and breaking equipment is listed. Included are breakers for handling the largest lumps produced, crushers for reducing to egg or nut sizes, and others for reducing to screening or stoker sizes. This 20-page bulletin explains diagrammatically the installation of the various breakers with circuit diagrams to show electrical control.

RECONDITIONED MACHINERY. *Morse Bros. Machinery Co.*, Denver, Colo. Bulletin 461 is a 36-page illustrated booklet listing available reconditioned mining machinery. The booklet is arranged alphabetically and both mill and mining equipment are included. Dimensions are shown for each piece of equipment and in the case of motors and air compressors, capacities are also indicated. For the small mine operator this booklet is a very convenient reference, as well as a catalog.

ROTARY KILNS. *Vulcan Iron Works*, Wilkes-Barre, Pa. Bulletin No. A-442 is a comprehensive catalog of rotary kilns, dryers and processing equipment. The bulletin is 28 pages in length with numerous photographs and diagrams explaining the installation and operation of continuous rotary dryers, briquetting machines, rotary roasters, retorts, and calciners. Constructional features are shown by means of diagrams; the installation methods are explained in considerable detail.

STEEL COUPLINGS. *The Falk Corp.*, Milwaukee 8, Wis. In a 32-page three-colored booklet emphasis is placed on the selection of the right couplings for a specified job. Detailed illustrations describe the new Falk Type F steelflex couplings and eight other types developed to meet special purposes are also pictured. A convenient service factor table is included and formula is given for selecting steelflex couplings. The bulletin is listed as No. 4100.

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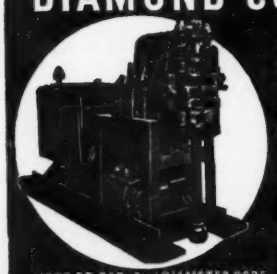

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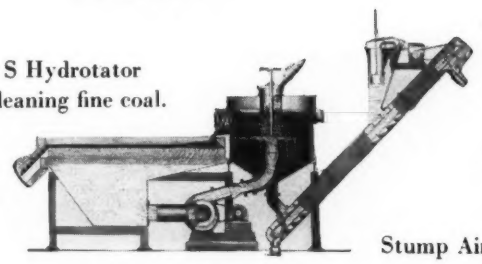
Index To Advertisers

	Page
American Chain & Cable — American Cable Division.	8
Centrifugal & Mechanical Industries, Inc.	54
Edison, Thos. A., Inc.	12
Electric Storage Battery Co., The	19
Gardner-Denver Co.	9
Goodman Mfg. Co.	10-11
Gould Storage Battery Co., The	16
Harnischfeger Corp.	17
Hoffman Bros. Drilling Co.	64
Independent Pneumatic Tool Co.	6-7
I-T-E Circuit Breaker Co.	51
Jeffrey Manufacturing Co.	34-35
Joy Manufacturing Co. — Sullivan Division.	15-18
Kennametal, Inc.	36
Link-Belt Co.	13
Mack Trucks, Inc.	5
Mines Equipment Co.	4
Mine Safety Appliances Co.	Back Cover
Mott Core Drilling Co.	64
Paris Manufacturing Co.	55
Pennsylvania Drilling Co.	64
Roberts & Schaefer Co.	Third Cover
Robinson Ventilating Co.	64
Sauerman Bros., Inc.	57
Standard of California	14
Tamping Bag Co.	59
Union Pacific Railroad	56
Union Wire Rope Corp.	2-3
Universal Vibrating Screen Co.	64
Worthington Pump & Machinery Co.	Second Cover
Young, L. E.	49

HERE IS A MAN WHO MAKES HIS COAL WORTH MORE



R & S Hydrotator
for cleaning fine coal.

This man and other smart coal producers extract every ounce of revenue from every ton of coal they mine. Only through planning and careful engineering can this be done—a Roberts & Schaefer specialty for over forty years—which has developed the Hydrotator Process illustrated here and used in so many successful coal cleaning plants.

It will be worth your while to consult Roberts & Schaefer about their Hydrotator, Hydro-Separator and Stump Air Flow Process and specialized engineering service.

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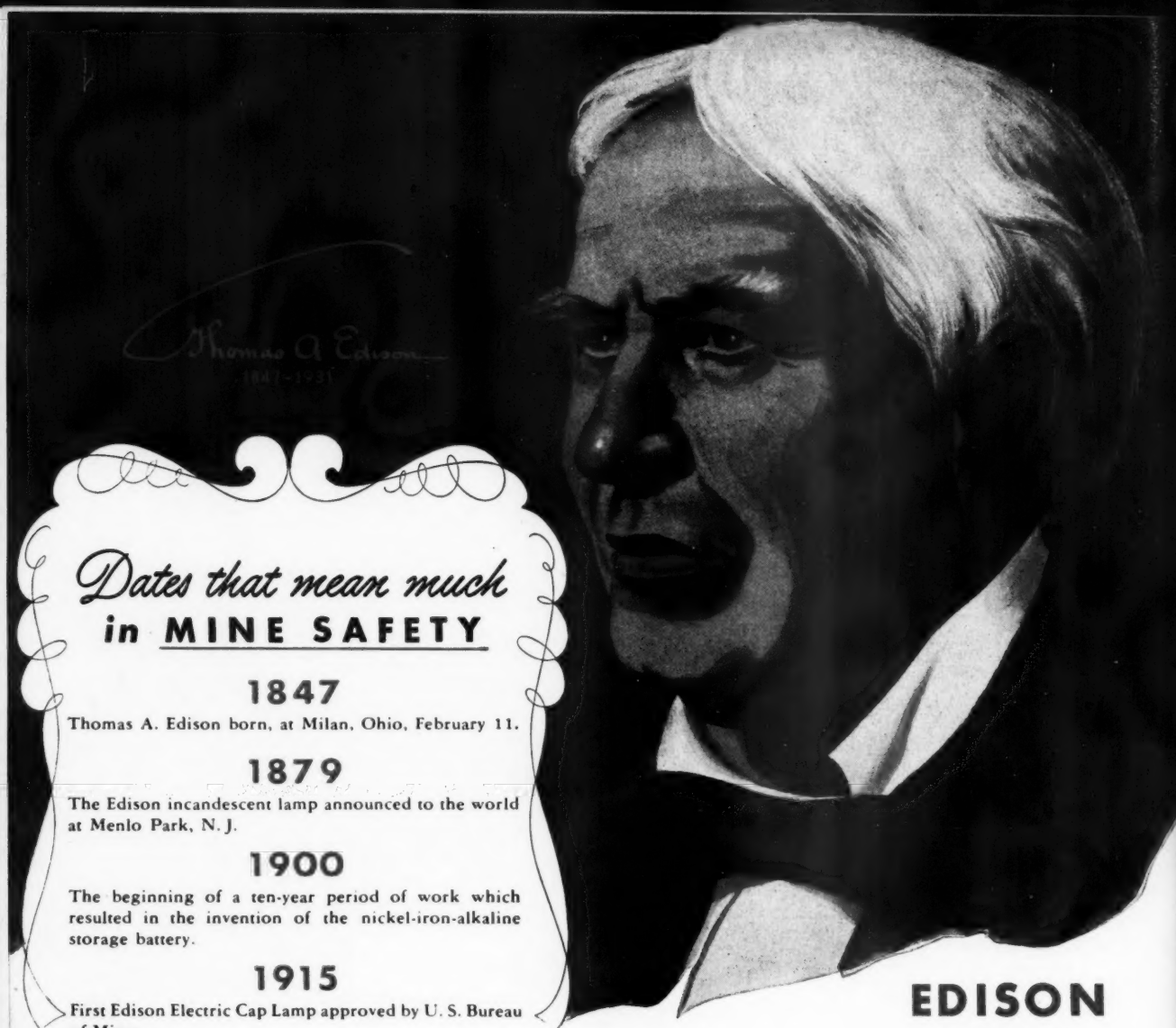

Dates that mean much in MINE SAFETY

1847

Thomas A. Edison born, at Milan, Ohio, February 11.

1879

The Edison incandescent lamp announced to the world at Menlo Park, N. J.

1900

The beginning of a ten-year period of work which resulted in the invention of the nickel-iron-alkaline storage battery.

1915

First Edison Electric Cap Lamp approved by U. S. Bureau of Mines.

1947

Edison Electric Cap Lamps now provide over 600,000 miners around the world with better, safer illumination.

EDISON
ELECTRIC
CAP LAMPS

M·S·A
COMFO CAPS

The Edison Electric Cap Lamp represents three great achievements of Mr. Edison: the development of the incandescent lamp; the nickel-iron-alkaline storage battery; and the design and construction of the combination of these into safe, effective illumination for the miner.

Continuously improved since its introduction, the Edison Electric Cap Lamp today is the standard of the mining industry —indispensable throughout America and the world.

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